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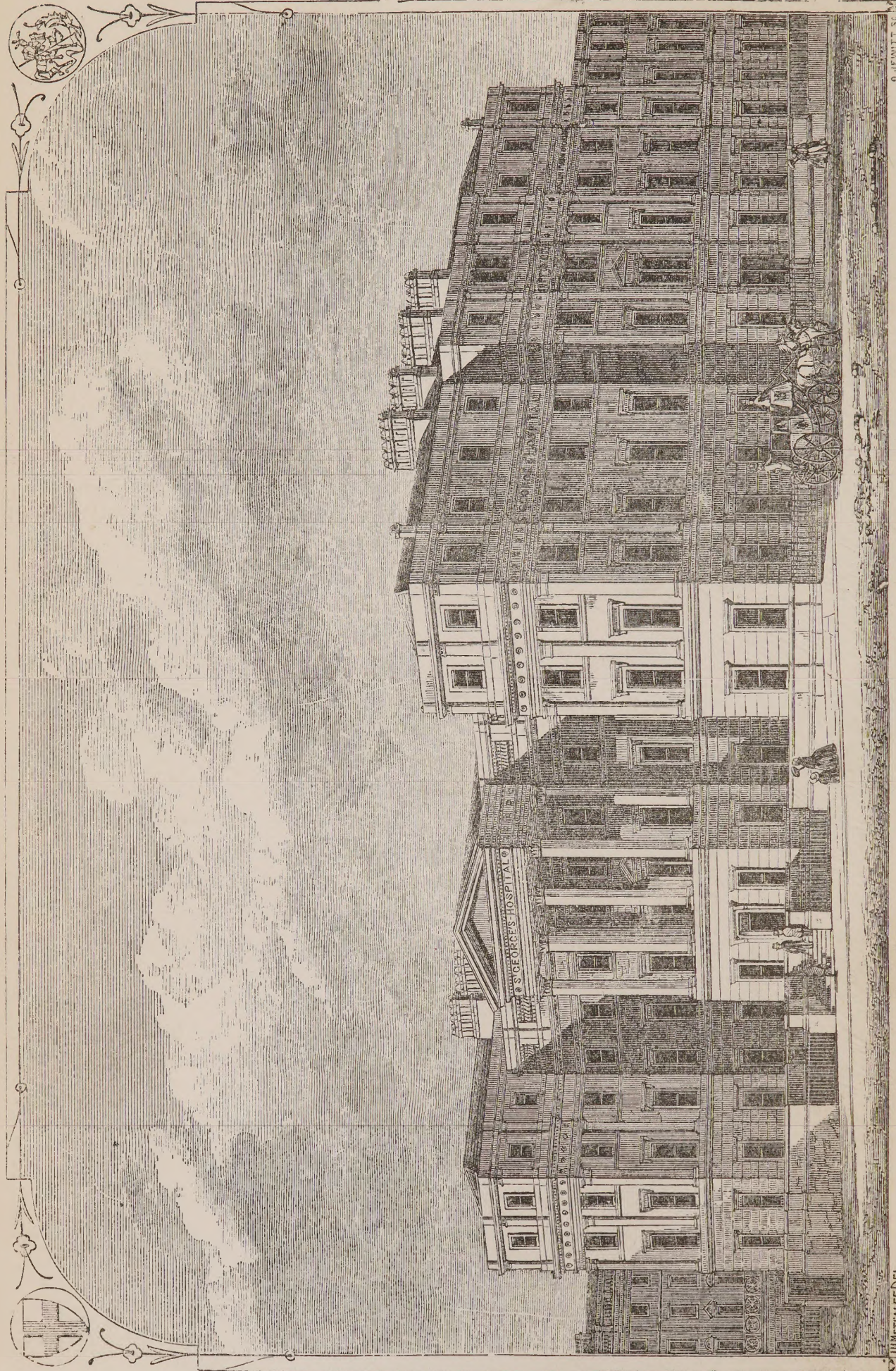
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ST. GEORGE'S HOSPITAL

REPORTS.

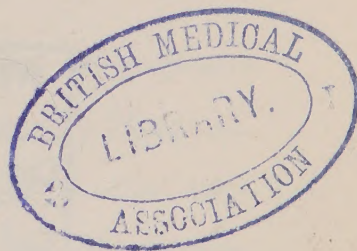
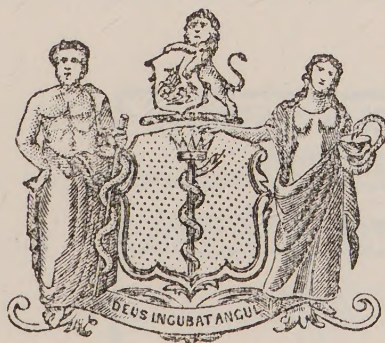
EDITED BY

JOHN W. OGLE, M.D. F.R.C.P.

AND

TIMOTHY HOLMES, F.R.C.S.

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PREFACE.

THE present volume, containing several illustrations, is the first of a series of Reports and Communications upon subjects connected with Medicine and Surgery, which we hope to edit annually. Its contents, with one exception, viz. the opening paper by our Senior Physician on the history of our Hospital, are essentially practical; and are almost entirely written by the Medical Staff of the Hospital and Lecturers at our School of Medicine. In addition to papers of this nature, we shall on future occasions, as opportunity may offer, give insertion to others on subjects of a collateral character. We also anticipate having material coöperation from former students of the Hospital not now resident in London.

The work was originally designed mainly as a means of registering the experience attained within the Hospital. Its nucleus and gist is therefore to be found in the concluding Reports by our Medical and Surgical Registrars, which furnish a complete *résumé* of the cases that have received treatment in our wards during the year 1865.

THE EDITORS.

October 1, 1866.

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ST. GEORGE'S HOSPITAL REPORTS.

I. SOME ACCOUNT OF ST. GEORGE'S HOSPITAL AND SCHOOL.

ST. GEORGE'S HOSPITAL was first opened for the reception of patients, January 1, A.D. 1733-4, in Lanesborough House, which occupied part of the premises on which the Hospital now stands. Its institution was owing to dissensions which arose among the subscribers to the Westminster Infirmary.

This charity, for the relief of "poor, sick, and disabled persons," was originally established in Petty France, Westminster, A.D. 1719, by several individuals who had previously made common cause for the relief of sick prisoners in Newgate, the Clink, and other prisons of the metropolis. It was the first hospital for the sick supported by voluntary contributions; and met with such support that the subscribers, in 1724, found it necessary to remove to a larger house in Chappell Street. The funds, and applications for admission, continuing yearly to increase, and the house in Chappell Street having been reported to be in a ruinous condition, it was deemed expedient to procure larger and more suitable premises. Two houses for this purpose having been offered to the managers—one in Castle Lane, Pimlico, the other Lanesborough House, near Hyde Park Corner—opinions were much divided as to the greater eligibility of these two localities and premises. The discussion was carried on with much heat, till the question was eventually settled by a resolution, passed at

a general board of the subscribers, "That the house in Castle Lane should be purchased for the infirmary." Upon this decision, "many of the subscribers, who had been originally and principally concerned in carrying on the undertaking, with all the physicians," determined to take a lease of Lanesborough House, which, in their opinion, "on account of the strength of the building and the airiness of the situation, was much more convenient to answer the ends of the charity."

This was accordingly effected; and on the 19th of October 1733 a general meeting of the gentlemen who were favourably disposed to the new institution was held in Golden Square, at the house of one of the subscribers, when committees were appointed, "to fit up Lanesborough House for the reception of patients with all convenient speed;"—"to draw up bye-laws for the management of the new hospital upon the model of St. Thomas's Hospital." At this meeting six* physicians (Drs. Tessier, Stuart, Wasey, Broxolme, Burton, and Ross), with three surgeons (Messrs. Dickins, Amgand, and Wilkie)—all of whom "having declared their willingness to serve without fee or reward"—were elected medical officers; and at a meeting a few days after, Mr. Cheselden's name was added to the list of surgeons. Other officers also were appointed.

At one of these meetings probably, Richard Willis, then Bishop of Winchester, was elected president; but he did not survive the first year of office. After his death the Governors solicited the patronage of Frederick, Prince of Wales, and requested his acceptance of the office of president. His Royal Highness was pleased to accede to their request; and the office of president has ever since been held by one of the royal family, and (with the exception of the short period when George III., after the death of his father, held it till the death of George II.) by the reigning sovereign.

Preparations were immediately made to adapt Lanesborough House for the reception of patients; and whilst these were in progress, committees of the subscribers were held at various coffee-houses, and were occupied in drawing up regulations for the different departments, in making con-

* The number was shortly afterwards reduced to four.



ST. GEORGE'S HOSPITAL,

1746.

From the picture by R. WILSON, R.A., in the Foundling Hospital.

tracts for stores and provisions—in receiving subscriptions—electing governors, and also in a vain endeavour to get the managers of the Westminster Infirmary to hand over to the trustees of St. George's a portion of the funds in the treasury at the time of the separation.

The new institution, however, met with great public support; subscriptions and donations rapidly poured in; and among its early supporters we find the names of Dr. Richard Meade and Sir Hans Sloane,* the most eminent medical men of that day, whose example and influence must have most materially tended to promote the success of the Hospital.

By the end of the year (1733) the arrangements at Lanesborough House were in such a state of forwardness that the Governors determined to admit patients; and accordingly, on the 1st of January 1733-4 the Hospital was opened, and the first patients were received in the wards.

From this time boards were held weekly at Lanesborough House for the admission of patients, and the transaction of the ordinary business of the Hospital; while committees for special matters were held as before, at coffee-houses, for the greater convenience of the members, as Hyde Park Corner was in those days considered to be “out of town,”† and indeed was considered the boundary of town and country till the removal of the turnpike in October 1825.

The Hospital at first was only furnished with thirty beds; but very soon the number was increased to sixty. These, however, were found inadequate to meet the demands for admission; and the funds of the charity rapidly increasing, it was resolved, in the beginning of 1735, to enlarge the house, and to procure, if possible, some addition to the premises.

A committee was accordingly appointed to inquire into the tenure of Lanesborough House, and to report on the means of enlarging the accommodation for patients. By

* Sir Hans Sloane, Bart., was an ancestor of the Earl of Cadogan, one of the present treasurers of St. George's Hospital.

† “Lord Lanesborough certainly thought so,” says Pennant, “by the curious distich he had inscribed on the front of his house :

“ It is my delight to be
Both in town and country.”

April 11, 1735, the committee were able to report "that the annual income arising from subscriptions was sufficient to relieve 100 in-patients more than the present house can contain; and that the balance of the audit of the preceding year would be sufficient to defray the charge of erecting an additional building for that purpose." For the furtherance of this object the committee recommended the purchase of the freehold of Lanesborough House, and two adjoining houses, held under the Dean and Chapter of Westminster, and also of "two acres of the field adjoining the Hospital to the south," the property of Sir R. Grosvenor, Bart.*

These recommendations were approved, and steps were at once taken to effect the purchase of these premises. A satisfactory arrangement was speedily made with the Dean and Chapter of Westminster, who were willing to sell their property as soon as they might be enabled by act of parliament to do so. Before long the act was passed, and the freehold of Lanesborough House, with the adjoining houses, became the property of the trustees of the Hospital, at the very reasonable price of 500*l*. The negotiations with Sir R. Grosvenor, however, were not so successful; and it was not till 1767 that the trustees were able to obtain from Richard, Lord Grosvenor, a lease of the piece of ground upon which the southern half of the present Hospital is built, and part of the present garden, formerly called "the airing ground." The lease was granted for ninety-eight years, at a peppercorn rent, "as long as the premises should be occupied as a public hospital."†

Whilst these negotiations were pending, the Governors made an attempt to procure a royal charter, and render the institution permanent by act of parliament. A petition for this purpose was addressed to the Queen (at that time, in the absence of George II. in Hanover, the regent and guardian of the realm) in council, praying "that the society might be incorporated by the style and title of the Royal Hospital of St. George," with power to hold lands under mortmain, &c. The petition was sent in the first instance to the Lord Chan-

* Ancestor of the Marquis of Westminster.

† This lease, having recently expired, has been regranted by the Marquis of Westminster for twenty-one years from Lady-day 1865, on the same conditions as that originally granted, and renewable at the expiration of nineteen years.

cellor, who apparently approved of the request for a charter, but objected to the title—"that the addition of 'royal' was improper;" "that there was no necessity for a royal charter to be confirmed by act of parliament;" and "that the trustees ought not to hold any lands in mortmain whatsoever, except such as were necessary for the site of the Hospital."

Probably from this unfavourable opinion of the Lord Chancellor* (whose character and opinions were held in the highest respect), the question of the charter, though for some time agitated, was soon dropped, and was not renewed till more than eighty years afterwards.

As soon as the agreement with the Dean and Chapter of Westminster was completed, the works at Hyde Park Corner were forthwith taken in hand, and under the direction of Mr. Isaac Ware, of H. M.'s Board of Works, were carried on with such activity, that in a few months the Hospital, much improved in its arrangements and furnished with two hundred beds, was ready for the reception of patients. In this state it continued without any notable alteration till 1825, when, from the great increase of the population, the applications for in-door relief far exceeded the accommodation which the Hospital could supply; and the conditions of the wards, and the other arrangements of the building, were found to be very faulty, and unfit for the requirements of an improved state of medical and sanitary science.

The defects and inconveniences of the building having been brought to the attention of the Governors, after full consideration it was thought best to rebuild the Hospital entirely; and for this purpose Mr. Wilkins (the architect of the London University and National Gallery) was selected to furnish the design. Under his superintendence the work of rebuilding was at once commenced, at the rear of the old Hospital; the patients meanwhile continuing to occupy the old building till the new was complete and ready for their reception. By April 1834 the new erection was finished, with accommodation for 325 in-patients, a theatre for lectures, and a museum for the pathological preparations.

* Lord Talbot, of whom Lord Campbell says, in his *Lives of the Chancellors*, "Every contemporary notice was an unqualified eulogium. Those who value him as I do can never tire of the repetition of his praise."

These improvements and extension of the usefulness of the charity were in a great measure due to the exertions of Mr. H. P. Fuller,* by whom the plan for rebuilding the Hospital was first proposed, and by whose indefatigable industry in obtaining the necessary funds it was eventually carried out. Mr. Fuller still lives, *viridi senectute*, to rejoice in this good work. But the institution has lost another most valuable friend, who laboured with equal zeal in promoting the success of the undertaking—Mr. Joseph Gunning,† the late secretary. For fifty-five years Mr. Gunning held the combined offices of secretary and solicitor; and to his courtesy and readiness in imparting information to all visitors of the Hospital may be traced many a donation and subscription; and by his exertions a large sum of money, which had been bequeathed for charitable purposes in general, was procured from the Court of Chancery in aid of the rebuilding of the Hospital.

In June of this year (1834) an Act of Incorporation was obtained, which confirms all the existing rights of the Hospital, and empowers the trustees “to hold property to the amount of 20,000*l.* per annum, without incurring the penalties or forfeitures of the Statute of Mortmain;” a most important clause, as it enabled the late Sir Thomas Apreece to bequeath his estates to St. George’s, in preference to other hospitals supported by voluntary subscriptions. This legacy (though, from the opposition of the heir-at-law, a compromise was deemed expedient, and the Hospital eventually received only a moiety of the estate) has enabled the Governors not only to maintain the charity in its contemplated extent of usefulness, but also to add considerably to its accommodation.

In 1851 the south wing of the building was extended at its western end, which has supplied room for twenty-five additional beds. In 1859 the north and south wings were raised a story, furnishing airy and spacious sleeping-rooms for the nurses (who up to this time had been wretchedly lodged), and also two large and cheerful wards (one for men and the other for women), in which the convalescents may pass the

* Still one of the visiting apothecaries of the Hospital.

† Mr. Joseph Gunning was the son of the Rev. Joseph Gunning, vicar of Sutton, Suffolk, the nephew of Mr. John Gunning senior, and brother of Mr. John Gunning junior, both surgeons of the Hospital. Died 1860.

greater part of the day, with obvious advantage not only to themselves, but also to those patients who are confined to their beds, or are not strong enough to leave the sick-wards.

More convenient accommodation too has been provided for the resident medical officers; and a reading-room has been furnished for the use of the medical students.

These alterations, with a better system of ventilation and warming by hot water, and more convenient baths,* have very considerably improved the healthy condition of the Hospital, and rendered it as efficient, in its means and appliances for the relief of the sick, as can well be in premises unfortunately so confined.

To some extent the want of space will be remedied by the Convalescent Hospital at Wimbledon.

In the year 1859 Mr. Atkinson Morley (proprietor of the Burlington Hotel in Cork Street) bequeathed to St. George's Hospital the savings of many years, for the purpose of erecting and endowing a hospital for the convalescent patients in St. George's Hospital. This legacy (with the accumulation of interest during the five years succeeding his death, as directed by his will), amounting to 150,000*l.*, was received by the trustees of the Hospital in 1865; and as soon as it became the property of the Hospital, steps were immediately taken to carry out the intentions of Mr. Morley. A committee of Governors was appointed for this purpose, who were able to purchase a piece of ground at the south-west corner of Wimbledon Common, twenty-eight acres in extent. A design by Mr. Kelly has been approved by the weekly board of Governors; and as soon as the contract with the builder has been arranged, the works will be put in hand.

It is obvious that this will prove a great addition to our resources for relieving the sick. It will not only be of advantage in effecting a speedier restoration to health of those who have been suffering from acute disease, but also, by enabling these to leave the Hospital at Hyde Park Corner at an earlier period than they otherwise would, and by the speedier transference of many patients labouring under chronic disorders, it will very considerably augment the number of persons who

* In the infancy of the institution, patients who required baths were sent to "the Bagno at Charing Cross."

will receive treatment as in-patients during the year. This will in some measure put St. George's on a par with the larger metropolitan hospitals in respect of the number of cases treated within its walls, and afford a larger field of study for our pupils.

Relief is not only afforded at the Hospital to the sick, but of late years a "Maternity department" has been established, for the purpose of delivering lying-in women at their own homes. It had been in contemplation to have such a department in the early days of the institution. In 1735 a committee recommended that twenty-five pregnant women should be admitted into the Hospital for delivery as soon as room could be found for them. The consideration, however, of the subject was deferred from one quarterly court to another; and apparently no further steps were taken to carry out the scheme, as no mention of it is found in the minutes of the weekly boards.

The first object, undoubtedly, of a hospital is the relief of the sick; but it cannot be said to fulfil its due measure of usefulness unless it contributes to the education of medical practitioners and the advancement of Medicine and Surgery.

It is to the credit of our Governors that in latter years they have acknowledged their obligation in this respect, and have given liberal assistance and encouragement to the maintenance of the Medical School, which for years had been allowed to struggle on without any support or material aid from the funds of the Hospital.

In the infancy of the institution, as soon as the angry feelings engendered by the separation from the Westminster Infirmary had calmed down, amicable relations were established between the managers of the two societies. Resolutions were passed by the Governors of St. George's that the physicians and surgeons might give their services, when required, to the Westminster; and in fact for several years some of the medical officers did from time to time attend at both institutions.*

* Cheselden operated at both Hospitals. Dr. Basham, physician to the Westminster Hospital, informs me that the table on which Cheselden used to operate at the old infirmary in Castle Lane is still preserved in the Broad Sanctuary, where the present Hospital was established in 1834.

From the first establishment of St. George's the physicians and surgeons were permitted by the laws of the Hospital to have a limited number of pupils, who attended them in their visits to the wards, and no doubt derived great advantage from seeing their modes of treatment, and learnt those nice distinctions in practice which can scarcely ever be fully conveyed to the student in lectures or in books. The surgeons' pupils "dressed" the patients; and both physicians' and surgeons' pupils were present at operations and examinations.

In 1773 John Hunter began to deliver lectures on surgery at Windmill Street, which the pupils of St. George's were allowed to attend gratuitously; but there is not any record of any lectures having been given within the walls of the Hospital till many years afterwards.*

Plans for the formation of a medical school were at various times proposed. In 1783 we find that a proposal had been made (apparently by John Hunter) "for the erection of a medical school on the footing of Guy's," and that "each surgeon should give six lectures on surgery." This scheme, however, was not approved by his colleagues, and reasons were assigned by them for the rejection of it, which for the most part seem to have been dictated by a feeling of opposition to J. Hunter, and cannot be said to be based on any valid ground of argument.

Again, in 1793, Messrs. Gunning, Walker, and Keate, then surgeons to the Hospital, having been taunted by John Hunter, their colleague, in no measured terms, with "having disgraced the Hospital by their neglect of the pupils," obtained from St. Thomas's, Guy's, St. Bartholomew's, and the London Hospital, reports on the mode of management adopted in the schools connected with these hospitals; and taking these for their guidance, drew up a scheme for the instruction of their own pupils and the formation of a medical school at St. George's.

* Ms. letters, &c., relating to the disputes between J. Hunter and his colleagues, in the possession of Mr. Charles Hawkins (one of the treasurers of St. George's Hospital), who has kindly allowed me to make use of them for this publication; and to whom also I am indebted for the inspection of a Ms. copy of Sir E. Home's Lectures on Surgery, by the late Dr. Nicholl, dated 1808-9.

In May 1793 they presented their report to a committee of the Governors appointed to "examine into the laws relative to the surgeons' pupils." In this they recommend that "an operation shall be performed on a dead body, attended with explanations, or a lecture given on some of the principal parts of surgery, once a week, by one of the surgeons in rotation, during nine months in the year, and that gratis." And after describing the inconvenience to the pupils, and loss of time incurred by their being obliged to run about the town in order to attend lectures, they recommend "that the Governors should give them leave to adopt the mode of discipline and instruction used by other hospitals," and "to bring home the different professors to the Hospital as soon as they can be engaged." To these proposals John Hunter, who had not been consulted either by his colleagues or the committee, objected that "they were in many respects very incomplete, and in some altogether impracticable." The Governors, however, approved of the recommendations of the committee; and though it does not appear that any thing was done towards the formation of a school at that time, several of the regulations they recommended have been acted upon, and are still in force.

I cannot learn that any lectures were given at the Hospital till Sir E. Home delivered a course of lectures on surgery, either at the end of the century or the beginning of 1800.

Mr. Bacot* informs me that when he became a pupil at St. George's in 1797-8, no physician or surgeon gave lectures at the Hospital; but that during his attendance, which lasted till 1803, a course of lectures on surgery was delivered by Sir E. Home.

It was not till 1831 (nearly one hundred years after the institution of the Hospital) that a complete school of medicine and surgery was established within its walls. In the autumn of this year† lectures on the principles and practice of medi-

* Formerly co-editor with the late Dr. Macleod of the *Medical and Physical Journal*, and surgeon to the Grenadier Guards.

† The first lecturers were :

Dr. Chambers,	}	Principles and Practice of Medicine.
Dr. Macleod,		
Dr. Wilson		Morbid Anatomy.
Sir B. Brodie,	}	Surgery.
Mr. Caesar Hawkins,		

cine and surgery, materia medica, and midwifery, with clinical lectures by the physicians and surgeons, were delivered in the theatre of the new Hospital, while part of the pupils learnt anatomy and dissected in Windmill Street; part at a new theatre built by Mr. Lane, at his house, adjoining St. George's Hospital, in Grosvenor Place; and chemistry was taught at the Royal Institution in Albemarle Street.

Not long afterwards the lectures at Windmill Street were discontinued, and some disagreement having arisen between Mr. Lane and a majority of the medical officers of St. George's, it was deemed desirable by the latter to have an anatomical theatre, and lectures more closely connected with the hospital staff, and under their entire control.

Suitable premises for this purpose were accordingly engaged in Kinnerton Street, and an anatomical theatre, museum, and lecture-rooms, with all suitable accommodation, presently erected. The capital for this outlay was advanced by the late Sir Benjamin Brodie, and the interest was paid from the fees of the pupils who entered to the anatomical class. This great tax on the anatomical department left little or no remuneration, after all the expenses were paid, for the lecturers. In 1849 the whole financial arrangements of the school were reconsidered, and put on a new and juster footing. Still it was found that the cost of the maintenance of the school absorbed nearly all the receipts, and it was thought expedient to bring the subject of the finances of the school under the consideration of the Governors of the Hospital. After a careful deliberation, a majority of the Governors decided that aid ought to be given to the support of the school and medical education, and voted a grant of 200*l.*, "for providing instruction in anatomy and chemistry, and for the

Dr. Seymour, Dr. Macleod,	} Materia Medica.
------------------------------	-------------------

Dr. H. Davies, Mr. Stone,	} Midwifery.
------------------------------	--------------

Mr. Herbert Mayo and Mr. Cæsar Hawkins in Windmill Street, Dr. Wilson and Mr. Lane in Grosvenor Place,	} Anatomy and Physiology.
--	------------------------------

Mr. Brande and Mr. Faraday lectured on Chemistry at the Royal Institution.

rent, taxes, and repairs of the premises in Kinnerton Street." This grant has ever since been annually renewed, and though inadequate to defray the rent and other expenses of Kinnerton Street, is a gratifying earnest of the recognition of the school, and the interest felt by the Governors in the education of the medical students.

Assistance, moreover, has been rendered to the medical department of the Hospital by the grant of salaries to the curator of the pathological museum, and the registrars of the cases admitted into the Hospital, while several Governors have liberally founded prizes* for competition, as an incitement and encouragement to industrious pupils.

The museum of the Hospital contains a very interesting and valuable series of preparations illustrative of morbid anatomy, carefully arranged and catalogued. These have been for many years collected, and are partly the fruits of the labours of successive curators, partly the donation of various private collections and specimens; among these we may particularly mention that of the late Sir B. Brodie, rich in preparations of diseased bones and joints, illustrated by a fine collection of water-colour drawings presented by his son, the present Sir Benjamin Brodie. There is also a collection of beautiful water-colour drawings of diseased viscera presented by the late Dr. Seymour. The late Mr. Robert Keate, Mr. Cæsar Hawkins, and more recently the late Mr. Stone (sometime lecturer on midwifery at the Hospital), have also enriched the museum with their collections; and the present Marquis of Downshire has also presented many curious specimens; to these we may add Dr. Robert Lee's important preparations illustrative of the nerves of the heart and uterus, which are for the present exhibited in the museum.

The number of the preparations is not so large as in some other museums; but they afford ample opportunity for the study of all the varieties of morbid anatomy, and, in addition to these, there is a post-mortem and case register, in which are entered the morbid appearances found in bodies examined by the curator, with a record of the phenomena and symptoms observed during life in each case, appended by the registrars.

* An account of these will be found in the Prospectus of the Hospital School.

These books have been kept for more than twenty years, and contain a body of facts of the highest interest and importance for medical study, and we may add, with pride, such as no other hospital can rival.

These are open for inspection to the pupils of the Hospital, and to all others who may wish to consult them (under certain conditions), for several hours in the day, when the curator is in attendance, and every facility is afforded for their examination.

The general management of the School is intrusted to the Medical School Committee (composed of the physicians, surgeons, assistant-physicians, and surgeons), who make all requisite arrangements for the instruction and discipline of the pupils.

This committee is under the control of a Medical School Council (composed of the members of the Medical School Committee and twelve other governors appointed annually by the Weekly Board); their office is mainly to see that the laws and regulations passed by the Weekly Board for the management of the School are properly carried out. This arrangement is found to work with great advantage, preventing hasty decisions in the Medical School Committee, and collisions with the board on medical matters.

Thus a school of medicine has been gradually developed, which, considering the unrivalled advantages in point of situation, the facilities afforded for study in the wards, and the valuable collection of preparations in our pathological museum, may fairly challenge comparison, in almost every respect, with the older and richly-endowed hospitals of the metropolis. But, though our advantages are great, it must be confessed that we have to lament various shortcomings and deficiencies. One of these is the state of our nursing department. The importance of a good staff of nurses to a hospital every body admits. But to secure them the hospital itself should be a training-school of nurses. Under our present system we have had a succession of good head-nurses, who are attracted by high wages, for the most part persons of skill and experience. But the assistant and night nurses have been in many instances women without adequate knowledge or conduct; scrubbers of the wards as much as nurses;

conscious of their inferiority, and without self-respect, or earnest endeavour to better their condition.

To improve the status of these, and to encourage a higher tone of feeling and principles of action, the attention of the Governors should be particularly directed. To make this department thoroughly effective, it should be the duty of the head and assistant nurses to take charge of the patients by night as well as by day, alternately; as it is obvious that many diseases, as fevers, and most acute disorders, require as careful and skilful nursing in the night-time as they do by day; and there should be young persons learning their business under the tuition of the more experienced nurses. Such a system has been adopted in one or two other hospitals with good effect.* And it is to be hoped that ere long further improvement will be brought about with us, and that the difficulties arising from ultra-religious considerations, mis-statements, and misconceptions, which have hitherto prevented the adoption of a better plan, will not be found insurmountable.

Another disadvantage we labour under is want of space at Hyde Park Corner, that the School may be accommodated in close proximity to the Hospital. And although the Marquis of Westminster, with his usual liberality towards St. George's, has granted the Governors an important addition to the premises of the Hospital, which will render the out-patients' department more convenient and effective, and will enable a larger museum to be erected, yet we still require more space for carrying on the chemical and anatomical studies; it would be very desirable also to have a chapel fit for the performance of divine worship; and though last, yet not least desirable, a college with lodgings and a common hall for the students and officers of the Hospital.

We want, in fact, more money; for though, alas, "the two acres south of the Hospital" are not attainable, St. George's Place, in whole or part, might possibly be purchased. And surely for such an object (as we can scarcely hope for another instance of private munificence like that of Mr. Morley) the friends of the Hospital and those interested in the School

* Since this was written, some improvement has been made. The assistant nurses are no longer the scrubbers of the wards.

might combine to raise the necessary funds, and thus establish the Hospital and School on a thoroughly complete and efficient footing,—a worthy monument of science and charity.

List of the Physicians and Assistant-Physicians of St. George's Hospital from its foundation, A.D. 1733-4.

The short notices, which are appended to the names of the physicians in the following list, are for the most part an abstract of Dr. Munk's account of them, in his "Roll of the Royal College of Physicians in London;" from which interesting work he has kindly permitted extracts to be made for this publication.

The lives of a few of the most celebrated physicians and surgeons are to be found in separate biographies, but of the greater number little is now known; and though no doubt they added something to the general stock of professional knowledge, handed down traditionally from generation to generation in every hospital, only a small number have given to the world the result of their experience in published works. This is the more to be regretted, as the experience of such accomplished physicians as Nevinson, the Warrens, Chambers; and of such skilled surgeons as the Hawkinses, the Gunnings, Keates, and Babington, could have furnished most valuable contributions to medical science.

It has been thought better on the present occasion to confine these notices of the physicians and surgeons to such as have finished their course, and (as this publication will probably come into the hands of several unprofessional readers) avoid the suspicion of participating in a great and crying evil of the day—the advertising to the general public works which should be addressed to the members of the medical profession, who alone can judge of their real value.

	Physicians.
TESSIER, GEORGE LEWIS	1733—1735
M.D. Leyden; F.R.C.P.L.; Physician in Ordinary to King George II.; Physician to Chelsea Hospital.	
STUART, ALEXANDER	1733—1736
M.D. Leyden; F.R.C.P.L., F.R.S.; Author of "Dissertatio de Structurâ et Motu musculari."	

	Physicians.
WASEY, WILLIAM	1733—1745
M.D. Cantab.; Fellow and President R.C.P.L.	
BROXOLME, NOEL	1733—1735
M.D. and Travelling Fellow, Oxon.; F.R.C.P.L.; Physician to H.R.H. Frederick Prince of Wales.	
BURTON, SIMON	1733—1735
M.D. Oxon.; F.R.C.P.L.	
ROSS, DAVID	1733—1757
M.D. Rheims; L.R.C.P.L.	
PETERS, CHARLES	1735—1746
M.D. and Radcliffe Travelling Fellow, Oxon.; F.R.C.P.L.; Phy- sician Extraordinary to King George II.; Physician-General to the Army.	
BAILLIE, JOHN	1735.
Dr. Baillie's name is not found in the roll of the London College of Physicians, or as a medical graduate of either Oxford or Cambridge.	
There is no mention in the Minutes of the Hospital of either his resignation or that of Dr. Hutton, as their places were never filled up, and the original number of physicians (six) was re- duced to four.	
HOADLEY, BENJAMIN	1735—1751
Son of the celebrated Bishop of Winchester; M.D. Cantab.; F.R.C.P.L.; Physician to the Household of King George II. and that of Frederick Prince of Wales.	
He published his Gulstonian Lectures "On the Organs of Respi- ration." He was the author also of a comedy, "The Suspicious Husband."	
HUTTON, ADDISON	1736.
M.D. Oxon.; F.R.C.P.L.	
DAWSON, AMBROSE	1745—1760
M.D. Cantab.; F.R.C.P.L.	
He published "Thoughts on the Hydrocephalus Internus," and "Observations on Hydatids in the Heads of Cattle."	
BATT, JOHN THOMAS	1746—1762
M.D. Oxon.; F.R.C.P.L.	
CLEPHANE, JOHN	1751—1758
M.D. St. Andrews; L.R.C.P.L.	
GISBORNE, THOMAS	1757—1781
M.D. Cantab.; Fellow and President R.C.P.L.; Physician in Or- dinary to King George III.	
MONRO, DONALD	1758—1786
Son of Alexander Monro, Professor of Anatomy and Surgery in the University of Edinburgh; M.D. Edinburgh; F.R.C.P.L.; Physician to the Army.	
He published his Croonian lectures, with the title of "Prælec- tiones Medicæ ex Croonii Instituto, annis 1774-1775;" "An	

Physicians.

Essay on Dropsy and its different Species;" "A Treatise on Mineral Waters;" "Observations on the Means of Preserving the Health of Soldiers, and of Conducting Military Hospitals, and on the Diseases incident to Soldiers;" "A Treatise on Medical and Pharmaceutical Chemistry, and the Materia Medica."

WARREN, RICHARD 1760—1766

M.D. Cantab.; F.R.C.P.L.; Physician to King George III.
He published two papers in the "Medical Transactions."

JEBB, RICHARD, SIR, Knight 1762—1769

M.D. Leyden; F.R.C.P.L., F.R.S.; Physician Extraordinary to King George III.; Physician in Ordinary to George Prince of Wales.

BLANCHARD, WILKINSON 1766—1770

M.D. Cantab.; F.R.C.P.L.

WRIGHT, RICHARD 1769—1785

M.D. Cantab.; F.R.C.P.L.

PETIT, JOHN LEWIS 1770—1774

M.D. Cantab.; F.R.C.P.L.

Resigned St. George's, and was elected Physician to St. Bartholomew's Hospital.

BURGESS, JOHN 1774—1787

M.D. Oxon.; F.R.C.P.L.

The valuable collection of the *Materia Medica* in the College of Physicians was made by Dr. Burgess, and left by him to Mr. E. A. Brande (probably the oldest pupil of St. George's now living); by whom it was presented to the College of Physicians, with an interesting *Ms. Memoir* of Dr. Burgess, now in the College library.

MATTHEWS, JOHN 1781—1783

M.D. Oxon.; F.R.C.P.L.

MACKLESTON, W. HAWKINS 1783—1787

M.B. Oxon.

BARCLAY, JAMES ROBERTSON 1785—1800

Son of the historian, Dr. Robertson; M.D. and Radcliffe Traveling Fellow, Oxon.; F.R.C.P.L.; Physician Extraordinary to the Prince of Wales.

FORD, JAMES 1786—1793

M.D. Edinburgh; Licentiate R.C.P.L.

BAILLIE, MATTHEW 1787—1800

M.D. Oxon.; F.R.C.P.L., F.R.S.; Physician Extraordinary to King George III.

Dr. Baillie (whose great reputation as an anatomist and physician is still in the recollection of many living, and whose life has been ably written by Dr. Macmichael in the "Lives of British Physicians") published in his lifetime "The Morbid Anatomy of some of the most important Parts of the Human Body," and gave his anatomical preparations to the College of Physicians. He bequeathed also all his medical, surgical, and anatomical books, and the copper-plates of his illustrations of "Morbid Anatomy," to the College of Physicians; and after

Physicians.

his death his "Lectures and Observations on Medicine" were published; but only 150 copies were printed, in accordance with his will.

PEARSON, GEORGE 1787—1828

M.D. Edinburgh; Licentiate R.C.P.L.; F.R.S.

He lectured on Chemistry, Materia Medica, and the Practice of Medicine. He published numerous works on Small-pox and Vaccination, the Materia Medica and Articles of Food, and "A Syllabus of Lectures on the Practice of Medicine."

HEBERDEN, WILLIAM 1793—1803

Son of Dr. W. Heberden, the distinguished physician, and author of "Commentarii de Morborum Historiâ et Curatione;" M.D. Oxon.; F.R.C.P.L.; Physician in Ordinary to King George III. and the Queen.

He published an English translation of his father's work, "Observations on the Increase and Decrease of different Diseases, particularly of the Plague," and "Morborum Puerilium Epitome."

NEVINSON, CHARLES 1800—1825

M.D. Cantab.; F.R.C.P.L.

PEMBERTON, CHRISTOPHER 1800—1808

M.D. Cantab.; F.R.C.P.L., F.R.S.; Physician Extraordinary to King George III.

He published "A Practical Treatise on various Diseases of the Abdominal Viscera."

WARREN, PELHAM 1803—1816

Son of Dr. Richard Warren; M.D. Cantab.; F.R.C.P.L.

BANCROFT, EDWARD NATHANIEL 1808—1811

Son of Dr. E. Bancroft, F.R.S., author of the "Natural History of Guiana;" M.D. Cantab.; F.R.C.P.L.; Physician to the Army.

The state of his health caused his resignation of St. George's; and for the advantage of a warmer climate, he repaired to Jamaica as Physician of the Forces. Besides some Letters relating to military arrangements connected with the health of the troops, he was the author of "An Essay on the Disease called Yellow Fever; with Observations concerning Febrile Contagions, Typhus Fever, Dysentery, and the Plague;" which embodies the Gulstonian Lectures given by Dr. Bancroft at the College of Physicians, and "A Sequel to an Essay on the Yellow Fever."

YOUNG, THOMAS 1811—1829

M.D. Cantab.; F. and For. Sec. R.S.; Member of the National Institute of France.

"Eminent in almost every department of human learning." Besides his numerous scientific works, he was the author of "An Introduction to Medical Literature," and "A Practical and Historical Treatise on Consumptive Diseases."

CHAMBERS, WILLIAM FREDERICK 1816—1839

M.D. Cantab.; Physician to King William IV. and Queen Victoria; K.C.H., F.R.S., F.R.C.P.L.

Lectured at the Hospital on "The Principles and Practice of Medicine" in 1831. Many of his Lectures are published in the "Medical Gazette;" and those on cholera were published separately.

Physicians.

HEWETT, CORNWALLIS 1825—1833

M.D.; Downing Professor of Physic; Cantab. F.R.C.P.L.

SEYMOUR, EDWARD JAMES 1828—1846

M.D. Cantab.; F.R.C.P.L., F.R.S.; formerly Lecturer on "Materia Medica" with Dr. Macleod.

Author of "Diseases of the Ovaria," "On Dropsy," "The Medical Treatment of Insanity," and "Thoughts on the Nature and Treatment of several severe Diseases of the Human Body."

Died May 1866.

*WILSON, JAMES ARTHUR 1829—1857

M.D., and Radcliffe Travelling Fellow, Oxon.; F.R.C.P.L.; son of the distinguished anatomist and lecturer, Mr. Wilson.

Formerly Lecturer on Morbid Anatomy at St. George's Hospital, and Lecturer on Anatomy and Physiology with Mr. Lane in Grosvenor Place. Author of works on "Spasms, Languor, Palsy, and other Disorders of the Muscular System;" "On Erysipelas and Rheumatic Fevers," &c.

MACLEOD, RODERICK 1833—1845

M.D. Edinburgh; F.R.C.P.L.; Lecturer on the "Principles and Practice of Medicine" at the Hospital, in conjunction with Dr. Chambers, and on the "Materia Medica" with Dr. Seymour.

He published "Rheumatism and its various Forms"—the substance of his Gulstonian Lectures, illustrated by his hospital experience. He was for many years the editor of the "Medical Gazette."

HOPE, JAMES . . . the first Assistant Physician, 1834—1839

Physician, 1839—1841

M.D. Edin.; L.R.C.P.L.; F.R.S.; Lecturer on Forensic Medicine at the Hospital.

Author of a work on "Morbid Anatomy," and a "Treatise on the Diseases of the Heart and Great Vessels."

*NAIRNE, ROBERT . . . Assistant Physician, 1839—1841

Physician, 1841—1859

M.D. Cantab.; F.R.C.P.L.; Commissioner in Lunacy; late Physician and Lecturer on the Theory and Practice of Physic.

*PAGE, WILLIAM EMMANUEL . . . Assistant Physician, 1841—1845

Physician, 1845.

M.D. Oxon.; F.R.C.P.L.; late Lecturer on the Theory and Practice of Physic.

*JONES, HENRY BENICE . . . Assistant Physician, 1845—1846

Physician, 1846—1862

M.D. Cantab.; F.R.C.P.L., F.R.S.

Author of "Gravel and Gout," "Animal Electricity," "Animal Chemistry, in relation to Stomach and Renal Diseases," &c.

*PITMAN, HENRY . . . Assistant Physician, 1846—1857

Physician, 1857—1866

Consulting Physician, 1866.

M.D. Cantab.; Fellow and Registrar R.C.P.L.

* Marked thus are still living.

- *FULLER, HENRY WILLIAM . Assistant Physician, 1848—1857
Physician, 1857.

M.D. Cantab.; F.R.C.P.L.

Author of a "Treatise on Rheumatism, Rheumatic Gout, and Sciatica;" "Diseases of the Chest and Diseases of the Heart and great Vessels," &c. Formerly Lecturer on Medical Jurisprudence.

- *BARCLAY, ANDREW WHYTE . Assistant Physician, 1857—1862
Physician, 1862.

M.D. Cantab.; F.R.C.P.L.

Author of a "Manual of Medical Diagnosis," "Medical Errors," &c.

- *OGLE, JOHN WILLIAM . Assistant Physician, 1857.
Physician, 1866.

M.D. Oxon.; F.R.C.P.L.; formerly Curator of the Pathological Museum.

Author of papers "On the Connection between the Pupil of the Eye and the Spinal Cord;" "On Hemiplegia from pressure upon the Crus Cerebelli," &c.

- *WADHAM, WILLIAM . Assistant Physician, 1862.
M.D. St. Andrew's; M.R.C.P.L.; Lecturer on Medical Jurisprudence.

- *DICKINSON, WM. HOWSHIP . Assistant Physician, 1866.

M.D. Cantab.; F.R.C.P.L.

Author of papers "On the Influence of Digitalis upon the Uterus;" "Diseases of the Kidney;" "Intermittent Hæmaturia," &c.

- *LEE, ROBERT . Obst. Physician, 1853—1865
M.D. Edinburgh; F.R.C.P.L.; F.R.S.; Lecturer on Midwifery.
Author of works "On the Ganglia and Nerves of the Uterus;" "On the Ganglia and Nerves of the Heart;" "On the Pathology and Treatment of some of the most important Diseases of Women," &c.

*List of the Assistant Surgeons, Surgeons, & Consulting Surgeons
of St. George's Hospital from its foundation, 1733-4.*

- AMYAND, CLAUDIUS Surgeon, 1733—1737-8
Consulting Surgeon, 1737-8.

F.R.S.; Sergeant Surgeon to King George II.

Contributed several papers to the "Philosophical Transactions" on surgical subjects.

- DICKINS, AMBROSE Surgeon, 1733—1737-8
Consulting Surgeon, 1737-8.

Sergeant Surgeon to King George II.

- CHESELDEN, WILLIAM Surgeon, 1733—1737-8
Consulting Surgeon, 1737-8.

F.R.S.; Principal Surgeon to Queen Caroline, wife of King George II.; Surgeon to St. Thomas's Hospital, the Westminster Infirmary, and Chelsea Hospital.

Contributed many papers to the "Philosophical Transactions," and other scientific miscellanies. His chief works are, "Osteographia, or the Anatomy of the Bones;" "Anatomy of the

Human Body;" "Treatise on the High Operation for the Stone."

It is stated that out of forty-two persons cut by him for stone only two died, and that on one occasion the operation was performed in fifty-four seconds.

WILKIE, JAMES Surgeon, 1733—1743

MIDDLETON, DAVID Surgeon, 1734-5—1765

WREDEN Surgeon, 1733-4—1737-8

HAWKINS, CÆSAR Surgeon, 1735—1774

Sergeant Surgeon to King George II. and III. Created a baronet by George III., 1776.

Inventor of the cutting gorget. This improvement is said to have occurred to his mind from the circumstance of a favourite instrument having become thin on one edge by frequent use.

A remarkably dexterous operator.

As a striking contrast to modern practice, it is reported that he made 2000*l.* per annum by bleeding alone.

PAWLETT Consulting Surgeon, 1737-8.

BROMFIELD, WILLIAM Surgeon, 1744—1780

Surgeon to King George III.; Surgeon to the Lock Hospital, of which he was one of the founders. A contributor to the "Philosophical Transactions." He published several anatomical and surgical works, the principal of which are, "Syllabus Anatomicus Humani Corporis Partium;" "Chirurgical Observations and Cases;" "Syllabus Chirurgicus."

HEWITT, WILLIAM Surgeon, 1744—1760

GATAKER, THOMAS Surgeon, 1760—1768

Translated Le Dran's Surgery. Author of several essays on anatomical and surgical subjects: "The Structure of the Eye;" "Observations on Venereal Complaints and their Cure;" "Essays on Medical Subjects, with an Introduction on Hemlock, Corrosive Sublimate, and on Caustic Medicines in Cancerous Disorders."

GUNNING, JOHN Surgeon, 1765—1798

Surgeon to King George III.; Surgeon General to the Army.

HUNTER, JOHN Surgeon, 1768—1793

F.R.S.; Surgeon Extraordinary to King George III.

"The greatest man in the combined character of physiologist and surgeon that the whole annals of medicine can furnish." *Lawrence.*

The collected works of John Hunter were edited in 1835 by Sir J. F. Palmer (now President of the Legislative Assembly of Melbourne, Australia), in four vols. 8vo; to which are prefixed a life of the author, by Dr. Drewry Ottley. The Hunterian museum is his noblest monument—

" ære perennius,

Quod non

Possit diruere, aut innumerabilis

Annorum series, aut fuga temporum."

HAWKINS, CHARLES Surgeon, 1774—1783

Son of Sir Cæsar Hawkins, Bart.; Sergeant Surgeon to King George III.

His name, as "Master of the College of Surgeons," occurs in their

Charter of 1800. Like his father, he had a great reputation as a dexterous operator.

HAWKINS, GEORGE Surgeon, 1780—1783

Son of Mr. Pennell Hawkins, Sergeant Surgeon to King George III., and nephew of Sir Cæsar.

WALKER, WILLIAM Surgeon, 1783—1796

KEATE, THOMAS Surgeon, 1792—1813

Surgeon to the Prince of Wales (afterwards King George IV.); Surgeon to Chelsea Hospital; Surgeon General to the Army.

Author of "Cases of Hydrocele, with cases of Hernia Vesicæ Urinariæ and Hernia Incarcerata;" and Observations relating to the Discipline of the Army.

HOME, EVERARD Surgeon, 1793—1827

Consulting Surgeon, 1827—1892

Brother-in-law of John Hunter; Sergeant Surgeon to King George III. and IV.; created a Baronet 1812; Surgeon to Chelsea Hospital.

He contributed many papers to the "Philosophical Transactions." Author of numerous works on surgical subjects, "of great and acknowledged value," and "Lectures on Comparative Anatomy," in which are explained the preparations in the Hunterian Collection, &c., 6 vols. cr. 8vo.

GRIFFITHS, JOHN Surgeon, 1796—1822

HAWKINS, CHARLES Surgeon, 1798—1800

Elected for the second time.

GUNNING, JOHN, junr. Surgeon, 1800—1823

Nephew of John Gunning, before mentioned; Surgeon-in-Chief to the Army; C.B.

Served with the army under the Duke of York in Flanders, 1793-4; and throughout the Peninsular war, in every siege and action, with the Duke of Wellington, and was present at the battle of Waterloo.

He died in Paris in his ninetieth year, having retained his faculties to the last.

KEATE, ROBERT Surgeon, 1813—1853

Nephew of Thomas Keate, before mentioned; Surgeon to Queen Charlotte and the Princess Charlotte of Wales, and several other members of the Royal Family; Sergeant Surgeon Extraordinary to King William IV.; Sergeant Surgeon to Queen Victoria; Inspector-General of Hospitals; Fellow, and three times President, of the College of Surgeons.

A dexterous operator and excellent surgeon. Contributed to the "Medico-Chirurgical Transactions," vol. x. p. 278, "History of a Case of Bony Tumour successfully removed from the Head of a Female;" vol. xxxii. p. 68, "Case of Exfoliation of the Anterior Arch of the Atlas, with a Drawing of the Preparation."

BRODIE, BENJAMIN Surgeon, 1822—1840

Fellow and President R.C.S.; Fellow and President R.S.; Surgeon to King George IV.; Sergeant Surgeon to King William IV. and Queen Victoria; First President of the General Medical Council.

Created a Baronet 1834 by King William IV.

The works of this great surgeon and physiologist have been

recently published in a collected form, in 3 vols. 8vo, edited by Mr. Charles Hawkins (one of the present Treasurers of St. George's Hospital); with an Autobiography of the Author, and a short record by the Editor of the opinions held by the contemporaries of Sir B. Brodie of his character, and the wide influence he exercised on the Medical Profession.

EWBANK, GEORGE Surgeon, 1823—1825

JEFFREYS, Henry Surgeon, 1825—1830

Assistant Surgeon to the Third Regiment of Foot Guards.

Saw much service in the Peninsula. Author of "Practical Observations on the Use of Cubebs, or Java Pepper, in Gonorrhoea," and "Cases in Surgery from Practice at the St. George's and St. James's Dispensary."

Sir B. Brodie records in his "Autobiography" that he learnt the practice of keeping notes of cases from Mr. Jeffreys, the importance of which habit he strongly recommends in his addresses to the students of St. George's Hospital.

ROSE, THOMAS Surgeon, 1827—1829

Surgeon to the Coldstream Guards.

Author of a paper published in the "Medico-Chirurgical Transactions," vol. viii. p. 347, "Observations on the Treatment of Syphilis; with Cases in which a Cure was effected without the use of Mercury;" and vol. xiv. p. 251, "Observations on Depositions of Pus and Lymph occurring in the Lungs and other Viscera after Injuries of different Parts of the Body."

Sir B. Brodie, alluding to the friendship which existed between Mr. Rose and himself, considers that it tended very much to the improvement of his own character.

*HAWKINS, CÆSAR Surgeon, 1829—1861
Consulting Surgeon, 1861.

Grandson of Sir Cæsar Hawkins, Baronet; F.R.S., F.R.C.S.; Sergeant Surgeon to Queen Victoria; Fellow and a President of the College of Surgeons; Member of the General Council of Medical Education; formerly Lecturer on Anatomy in Windmill Street, and Lecturer on Surgery at St. George's Hospital.

Mr. Cæsar Hawkins is the fourth Sergeant Surgeon in his family; and it is a remarkable circumstance that twice these offices have been held by members of the same family at the same time: Sir Cæsar with his brother, Mr. Pennell Hawkins; the latter with his nephew, Mr. Charles Hawkins.

BABINGTON, GEORGE GISBORNE Assistant Surgeon,† 1829—1830
Surgeon, 1830—1843

F.R.C.S.; Surgeon to the Lock Hospital; Lecturer on Surgery at St. George's Hospital.

He published his "Hunterian Oration" 1842. It is much to be regretted that he made no other contribution to medical literature, which from his varied and profound learning he was especially fitted to make.

WALKER, ROBERT Assistant Surgeon, 1830—1840
Surgeon, 1840—1843

Surgeon to the Lock Hospital.

† Mr. Babington was the first Assistant Surgeon to that Hospital. Previously Assistants had from time to time been allowed to particular surgeons, when they were unable, from serving with the army, or in some instances from their private professional engagements, to do their duty at the Hospital.

*CUTLER, EDWARD . . . Assistant Surgeon, 1834—1843
 Surgeon, 1843—1861
 Consulting Surgeon, 1861.

F.R.C.S.; Consulting Surgeon to the Lock Hospital.

*TATUM, THOMAS . . . Assistant Surgeon, 1840—1843
 Surgeon, 1843.

F.R.C.S.; the First Lecturer on Anatomy in Kinnerton Street;
 the present Lecturer on Surgery.

Author of papers "On Hernia" and "Amputation at the Hip-Joint."

*JOHNSON, HENRY JAMES . . Assistant Surgeon, 1843—1848
 F.R.C.S.; formerly Lecturer on Anatomy in Kinnerton Street.

JOHNSON, HENRY CHARLES . . Assistant Surgeon, 1843—1853
 Surgeon, 1853—1863

F.R.C.S.; formerly Lecturer on Anatomy in Kinnerton Street,
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 rulent Deposits," "Phlebitis," "Varicocele." Contributor to
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 tomy in Kinnerton Street.

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 articles in that work, &c.

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 "Anchylosis," &c.

II. CONTRIBUTIONS TO THE SURGERY OF THE HEAD.



No. I.

ON THE DEVIATIONS OF THE BASE OF THE SKULL IN CHRONIC HYDROCEPHALUS.

THE deviations to which certain parts of the base of the skull are liable in chronic hydrocephalus have not, I think, received their due share of attention; and yet a thorough investigation of these deviations will amply repay the practical surgeon, and be of much more value to him than the study of those numerous and extensive changes in the vault of hydrocephalic skulls which have been so much, and at such length, dwelt upon by various authors.

The deviations of the base of the skull to which I now wish more particularly to call attention are those occurring in the lateral parts of the anterior and of the middle fossæ. And first, as to the anterior fossa. To the surgeon the most interesting deviation occurring in this region is that of the orbital plates. The orbital plates driven downwards either present a plane surface oblique from before backwards, or they may be perpendicular, or even convex, bulging into the orbit, so as to reduce it to a mere chink. The orbital arch is more or less done away with; the frontal and orbital portions of the bone may even present one continuous line convex in its whole length.

Associated as this deviation of the orbital plates is with dropsy of the ventricles, its existence and due import become of great practical value. If the orbital plates in a dropsical skull are driven down, we may be sure that the case was one

of ventricular dropsy; but should these plates of bone present their natural shape and direction, we may conclude, either that the effusion into the ventricle occurred at a period when the bones were not to be readily acted upon by the pressure of the fluid, or that the accumulation of the fluid was on the surface of the brain; in other words, arachnoidean, and not ventricular, dropsy.

In arachnoidean dropsy it must be borne in mind that the fluid is limited to the upper and lateral parts of the surface of the brain; and as this is invariably the case, however great may be the quantity of the fluid, it cannot press upon the bones at the base. This strict limitation of the fluid to the upper and lateral part of the surface of the brain is in the hæmorrhagic, the most common form of arachnoidean dropsy, due to a more or less well-defined membrane, forming in some cases a perfect cyst, which, if thick enough, may be removed unbroken with all its contents. Thus it was in M. Poumeau's case, one of the best marked on record. A parietal and a visceral layer formed perfect cysts, of very large size, covering the upper and the lateral surfaces of both hemispheres, and containing each 300 grammes of fluid. At the under part of the brain there was in this case, it is true, a false membrane; but this membrane was reduced to a single layer, corresponding exactly to each hemisphere. There was then no cyst in this region, and consequently no water to press upon the orbital bones of the anterior fossa.

In illustration of these facts. In a skull in the museum of the Royal College of Surgeons the orbital arch does not exist; there is not even a trace of it. The orbital plate, driven down, is convex, and bulges into the orbit; the frontal and orbital portions of the bone form one uninterrupted line, convex in its whole length. The case was one of ventricular dropsy.

In another skull, a gigantic one, also in the museum of the Royal College of Surgeons, and in which the vault is enormously expanded, the orbital plates, driven downwards, present a plane surface with a marked direction oblique from before backwards. The arch of the orbit exists to a certain extent, but the cavity of the orbit is encroached upon somewhat. This was also a case of ventricular dropsy, but one

in which the accumulation of the fluid began at a later period.

And in the huge hydrocephalic skull of Cardinal, in Guy's museum, the orbital plates are but slightly altered in their shape or direction. The case was one principally of arachnoidean dropsy. About seven pints of fluid were found in the cavity of the arachnoid. The perpendicular portion of the frontal is widely expanded; but its orbital portion, instead of being slightly concave, has simply become horizontal. The arch of the orbit is perfect.

And now comes the question as to whether we have any means of recognising during life the deviations which may have occurred in the orbital plates. If at all marked, these deviations are revealed by the state of the eyeballs. In such cases the eyes, more or less driven out of their sockets, have a marked direction downwards; a great part of the pupil is hidden beneath the lower lid, and the white of the eye is much more uncovered than usual.

The presence of this characteristic sign stamps, it is true, the case as one of effusion into the ventricles; but, unfortunately, its absence does not enable us to affirm that the effusion is in the arachnoid, and not in the ventricles, as deviation of the orbital plates does not, as we have already seen, take place in all cases of this class.

But as often as the eyeballs present, in any case of chronic hydrocephalus, the peculiar deviation just mentioned, so often may we remain assured that we have to deal with ventricular, and not arachnoidean, dropsy. All the so-called characteristics of arachnoidean dropsy may be present, and yet with this deviation of the eyeballs we may safely pronounce the case to be one of ventricular dropsy.

Of the truth of this, an interesting case mentioned by Dr. Battersby affords convincing proof. In this case the fluid was blood-tinged from the first to the last tapping; at each operation the fluid appeared also to be directly under the duramater. The child was well nourished, and had the free use of its organs. From these various circumstances combined, Dr. Battersby was led to believe that the fluid was in the arachnoid; and so firmly was he convinced of such being the case, that nothing but the post-mortem examination could have

persuaded him that the effusion was within the ventricles. And yet there is a point mentioned in this very case, which, notwithstanding the bloody serum, &c. &c., clearly revealed the true nature of the case: "The pupils are half sunk below the lower lids, the white of the eyes being nearly all that is visible of them." These are Dr. Battersby's words; and with such a description I have no hesitation in saying that ventricular dropsy was stamped upon the case from the very beginning.

I proceed now to the deviations of the middle fossæ of the skull; and as in the anterior, so in the middle fossæ, these deviations will, for the most part, be found to exist in the lateral parts of this region, where, by the bulging out of the bones, the base in some cases undergoes extensive and strange alterations, leading even to singular deformities about the face.

The hydrocephalic skull, 3489A, in the museum of the Royal College of Surgeons, so peculiar in many and other respects, presents a well-marked deviation of the middle fossæ of the base. The fore part of the squamous portions of the temporals, as well as the great wings of the sphenoid, are, in this specimen, driven outwards and downwards, and bulging into the zygomatic fossæ these bones lie on a level with the alveolar margins of the superior maxillaries. The zygomatic arches, closely fitted to the expanded bones, are themselves flattened, especially the malar bones, which are twice their natural width. There is also a great projection into the orbits of the orbital plates of the sphenoid, which are here quite convex. Internally, the sides of the middle fossæ are of great depth. The child reached his twelfth year.

And in the strange hydrocephalic skull, also in the College museum (3487), which belonged to a child, the bones at the base had also evidently undergone some great deviations. The central parts are wanting; but still there are traces enough in the lateral regions to prove that the base had been subjected to pressure from within. The zygomatic fossæ are almost filled up by the bulging outwards of the cranial bones. The zygomatic process of the left temporal, flattened, and measuring an inch in width, caps the expanded bones; on the right side, this process is broken off. The glenoid cavities



FCETAL HEAD,

in the Museum of the Royal College of Surgeons of England,

with saccular expansion, partly osseous and partly membranous, of the middle fossæ of the base of the skull, bulging outwards, and looking as if the cheeks were blown out.

are five inches apart. The orbits, also, driven widely asunder and downwards, measure from one external angular process to the other no less than seven and three-quarter inches.

But it is in the foetal head, presented to the College museum by the late Mr. Lomax, that we shall find the most extraordinary deviations about the base of the skull.

Leaving aside all the other abnormal features so plentiful about this extraordinarily misshapen skull, I wish, on the present occasion, to devote our attention solely to the deviations at its lateral parts, where will be found, on each side, a large pouch bulging outwards, and projecting forwards into the region of the cheek, as if the child's cheeks were blown out. Extending from the orbits, in front, to the spinous process of the occipital behind, these pouches, of the size of a pullet's egg, are partly osseous, and partly membranous. The upper and back part of each pouch is formed by a saccular expansion of the bones; the lower and front part by the temporal and the great wing of the sphenoid, separated from their articulations above, and extensively driven downwards, so much so that they leave a wide gap in the centre of the pouch, which is filled up by membrane. It would be difficult to say exactly what bones form the saccular expansion above and behind, such is the intimate blending of the osseous fibres all along this region. The position of the temporal is very curious; its squamous portion forms the floor of the pouch; driven horizontally outwards, and downwards below the level of the chin, this piece of bone lies with its outer surface in such a direction that it can only be seen when the base of the skull is turned upwards. And it will be observed also that, by this heeling-over, and depression of the temporal, the meatus externus is carried to the under part of the skull, below the level of the foramen magnum, and almost in contact with the condyloid process of the occipital. The great wing of the sphenoid pushed far forwards, and downwards along with the temporal, has lost all connection with the parietal and frontal, the space thus left by the out-driving of the bones being filled up by a membranous expansion. This great wing of the sphenoid bulges also into the zygomatic fossa, as well as into the orbit, upon the cavity of which, by being convex, it encroaches largely. The malar bone, flattened

out, is also carried far forwards and downwards, leaving a wide space, filled up by membrane, between it and the external angular process. By the displacement of all these bones, the zygomatic arch has been made to assume almost a perpendicular direction, and the lower jaw pushed very far forwards overlaps the upper one. In the fresh state, the child's cheeks must certainly have looked as if they were blown out.

I have dwelt thus minutely on the appearances observed about this skull, as I think that a clear apprehension of the formation of these pouches will enable us to explain the true nature of that curious and puzzling case mentioned by Creutzwiezer. (Rust, *Mag.* 1835, Bd. 45, p. 463.)

But before proceeding to Creutzwiezer's case, let me mention that Vrolik has a plate in which will be found an infant's skull precisely similar to that which we have just been examining. Disposition of bones, pouches on the sides of the face, membranous expansions, all must have been so precisely alike in the two skulls, that it requires some care to make out that Vrolik's plate was not actually drawn from this very skull in the College museum. A minute examination, however, shows here and there a few minor points by which the two skulls can be identified, notwithstanding their extraordinary similarity.

As for Creutzwiezer's case: the patient, a man, had been affected with chronic hydrocephalus ever since his birth, and the fontanelles were still largely open when he was three years old. He had attained his twenty-sixth year, when he fell under Creutzwiezer's notice, at which time his head was of a very large size, and presented the following appearances. At the junction of the parietals to the occipital, a roundish opening, an inch in diameter, was easily felt through the integuments. On pressing an egg, with its broad end downwards, some distance into this opening, it was seen to rise and fall synchronously with the respiration. The left side of the face was perfectly natural, but the whole of the right side was strangely deformed; the eye, the nose, the ear, the cheek, and the mouth, being all driven down about half an inch, and greatly increased in size. The whole cheek, when handled, felt exactly like a fleshy pouch filled with liquid. By lifting up this pouch, and squeezing it sharply, the depression in

which the egg had been placed, at the upper part of the head, was at once filled up, and the egg driven out of its position. On examining the head carefully, a cleft of the size of a goose's quill was detected between the right external angular process of the frontal and the malar bone, which was evidently forced downwards; and a similar cleft was also found in the mastoid process on the same side. It was by means of these fissures, or clefts, that the fluid in the cheek was supposed to communicate with that in the skull. At first it was thought that the fluid in the cheek might possibly be altogether confined to the outer parts, and that it reached the occiput by slipping under the scalp. A bandage was therefore passed tightly round the head, so as to cut off all possible communication between the cheek and the scalp; but the depression in the occipital region was still seen to fill up immediately when the cheek was sharply squeezed.

Such is Creutzwiezer's account of this remarkable case. I must say, however, that I do not believe this to have been the true nature of the case; the difficulties of which have, unfortunately, been made still more perplexing by the version which M. Chassaignac has given of it. In this version it is stated that the front cleft existed between the malar and the superior maxillary bones; but how such a cleft, supposing it to have existed, could, under any circumstances, lead to a communication with the inside of the skull, it would, indeed, be impossible to explain. This difficulty, at any rate, is got rid of at once by referring to the original, where it will be found, as I have stated, that the cleft was in reality between the external angular process of the frontal and the malar.

But taking now Creutzwiezer's own account, we shall still find it difficult to reconcile his explanation with the actual details of the case.

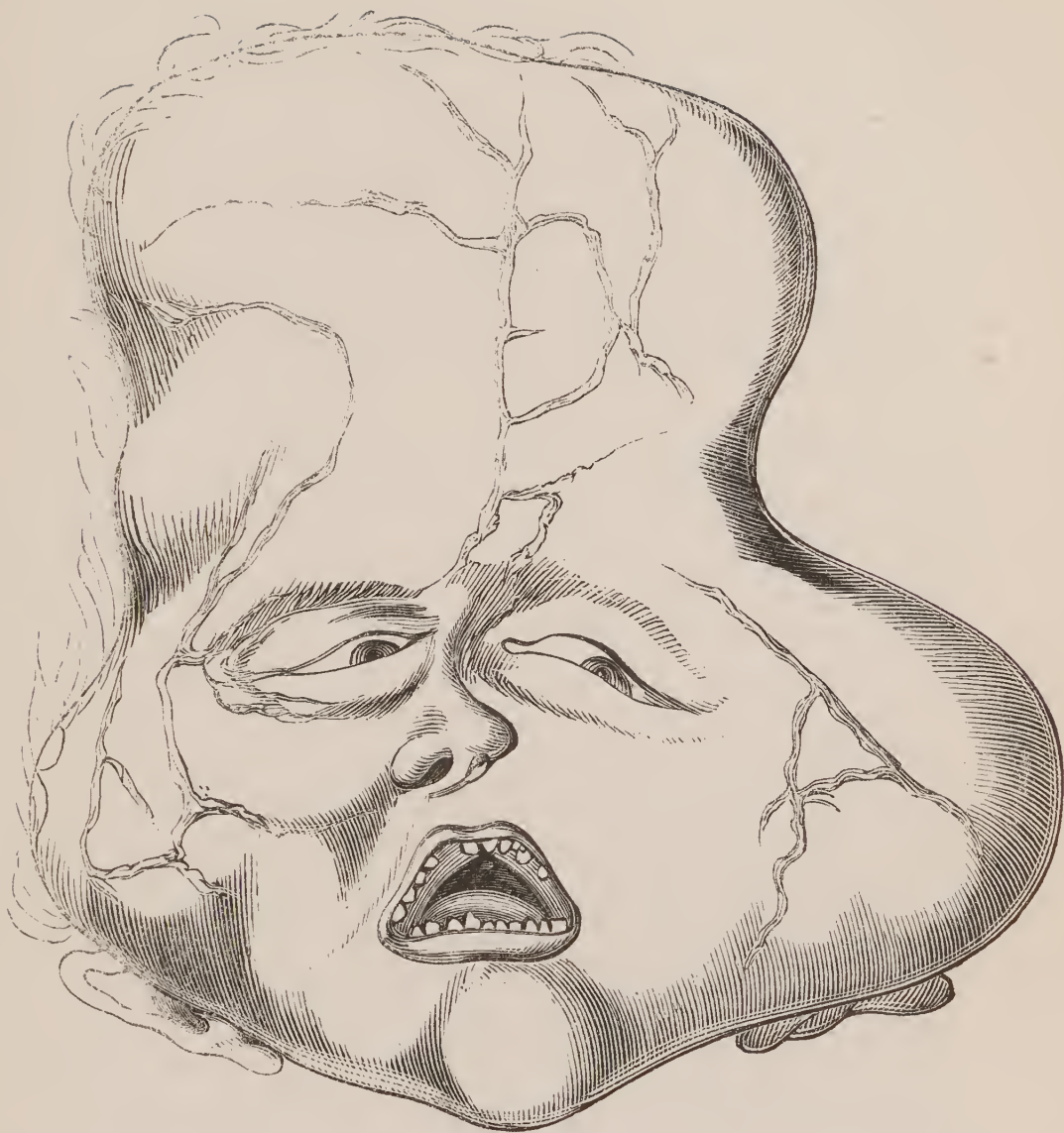
To understand this explanation, we must necessarily admit, either that the membranes lining the skull had given way at the supposed clefts, and thus allowed the fluid to escape from the cranial cavity and form for itself a pouch in the cheek, or we must admit that there were two saccular prolongations of these linings, through the clefts, in which the fluid was contained. Will either of these explanations satisfactorily account for the appearances observed in this case? I think not.

For my own part, I believe that this case of Creutzwieser's is to be explained by supposing it to have been somewhat of the same nature as that of the child whose skull we have just been considering. In this skull we had the pouch in the region of the cheek, and the dropping of the bones, which would have been much more marked had one cheek only, as in Creutzwieser's case, been affected. We also had the disjunction of the external angular process of the frontal from the malar, leaving a cleft-like space between these two bones; and, moreover, we may even trace a slight separation, cleft-like, of the bones at the back part; in fact, between the temporal and the expanded portion of bone behind, which, in the fresh state, might easily have been mistaken for the mastoid process. I say mistaken, for the process never could have been felt, being, as it is, at the under part of the skull, from the perfectly horizontal position of the temporal.

As in this head, then, so in Creutzwieser's case, I believe the fluid in the right cheek to have been contained in a pouch formed by the dilatation of certain parts of the base of the skull. The case was, therefore, not, as has been supposed, one of external hydrocephalus. No part of the fluid was on the outside of the skull; it was all still contained within the cranial cavity. There were no clefts, properly speaking; bones which ought to have been united were, it is true, driven asunder; but between them there were, I doubt not, as in this child's head, membranous expansions forming a part of the walls of the pouch.

And of this view of Creutzwieser's case we shall, I think, find a corroboration in Steinmetz's case of a child, about ten years old, whose head, with its expanded vault, and with its large lateral pouches, as if the cheeks were blown out, with its ears driven down, and lying horizontally and all but on a level with the chin (Gräfe und Walther, *Jour. für Chir.* 1833, Bd. 19, p. 119),^r must assuredly have been of the same kind as that of the little skull presented to the College museum by Mr. Lomax.

In cases such as these the pressure of the fluid accumulated in the lateral ventricles has borne upon their inferior horns, and these by their distension have caused the expansion of the corresponding part of the base of the skull. In



From Steinmetz.

CHRONIC HYDROCEPHALUS,

with bulging outwards of the middle fossæ of the base of the skull, forming large pouches,
as if the cheeks were blown out.

these cases, too, there was, at the same time, distension of the other parts of the lateral ventricles, as shown by the expansion of the vault in these skulls; and as all these dilated portions of the ventricles communicated freely with each other, the fluid could easily be squeezed from one part into another—from the pouch in the cheek up to the vault of the skull. But it now and then happens that the fluid is altogether limited, either by false membranes or by original malformations, to the inferior horn of the lateral ventricle, which thus becomes more or less dilated. A case has been described by G. Vrolik, in which the inferior horn of one of the lateral ventricles was thus cut off, and in which dropsy occurred, distending largely this portion of the brain and the corresponding part of the skull.

In this local, pouch-like expansion, partly osseous and partly membranous, of the middle fossa of the skull, we may trace something very similar to that which constantly occurs at the top of the brain-case of the crested cock. In this bird, it is well known that the anterior lobes of the brain are partly lodged outside the skull, in a small superadded case or pouch-like expansion, the walls of which are never completely ossified. In tracing the development of this strange peculiarity from the earliest periods of embryonic life, M. Spring observed that in the course of their development the anterior lobes of the brain gradually lift up the bones in the frontal region and separate them; the intervening fibrous membrane expands, and thus is formed a pouch-like cavity lined by the dura-mater and arachnoid, containing some fluid and a portion of cerebral substance. Gradually the intervening membrane becomes extensively ossified, and the superadded brain-case is completed.

In conclusion, let us not forget that our pouch-like expansion of the base of the skull in chronic hydrocephalus might under favourable circumstances, as commonly occurs in the expanded vault of dropsical skulls, become altogether ossified; and thus we might here have a bony capsule, the formation of which it would be difficult to explain, were we not aware that such was its origin.

PRESCOTT HEWETT.

III. A CASE OF MENINGOCELE, IN THE OCCIPITAL REGION,

WHICH WAS INJECTED WITH IODINE, WITHOUT ILL CONSEQUENCES,
THE PATIENT DYING OF BRONCHO-PNEUMONIA.

I HAVE thought that the following case would be of interest (although, perhaps, the treatment did not lead to any definite result), since the disease is a rare one, and attempts to arrest its progress by any operation have been still rarer. In the instance before us, that attempt proved unsuccessful, although many of the elements necessary for success were present; nor were there the contra-indications to operative interference which we so commonly meet with in this malformation. There was, however, one unfavourable symptom which made me look on the case with doubt from the commencement, and which would have rendered ultimate success very doubtful, even had the fatal complication of broncho-pneumonia not intervened. I mean, the existence of internal hydrocephalus, of which we had some evidence during life in the increasing size of the head and tension of the fontanelle. This was the only contra-indication to active treatment, and I did not regard it as absolute, since there was no reason to suppose that the brain had suffered any present injury, the child being well and lively; and if the iodine injection, which I contemplated, should succeed in modifying the action of the lining membrane of the protruding sac, there was some prospect that the same influence would be extended to the ventricle. At any rate, the attempt seemed worth the

risk, since there were many circumstances in this child's case which do not often meet together in this affection. In the first place, it was highly probable that the tumour contained none of the substance of the brain. It was transparent even down to the neck of the tumour, and the skull was perfectly formed and its ossification natural. The tumour, also, was pedunculated, which appears to be a favourable condition for operative interference, both as diminishing the prospect of brain-protrusion, and favouring the limitation of the irritative action of injections. Then the child was in good general health, and yet the constant and steady growth of the tumour, in spite of such opposition as we could make by pressure, left little prospect of prolonged life. Taking all these facts into consideration, and supported by the consent of Mr. Prescott Hewett, who was so kind as to see the case with me, I determined to propose to my colleagues to sanction the performance of an operation. My idea was to commence by the injection of tincture of iodine, in gradually-increasing strength. If this should be tolerated, but without producing a cure of the tumour, I intended to attempt its entire excision. Having obtained the assent of my colleagues, at least to the first part of my programme, I asked the mother to come into hospital with the child. I believe the cold and cough which ultimately proved fatal to the infant was contracted during the journey to the hospital. She lived at some distance, and the weather was inclement at the time.

The following notes of the case were taken at the time by Mr. Pick :

Elizabeth Gurton, æt. 5 months ; admitted Feb. 1, 1865.

History. When the child was born the mother noticed a tumour the size of a walnut at the back of the head. It gradually increased, but during the last month it has grown rapidly. It was quite soft when first noticed and freely movable. The child is not fretful, and never had any convulsions.

On Admission. There is a somewhat pendulous tumour the size of a duck's egg at the back of the head, connected by its neck to the under surface of the occiput. It is very soft and fluctuating, freely movable : but upon moving it on the bone the child cries ; during crying the tumour becomes somewhat more tense. The skin is extremely thin on the summit, and discoloured from a congenital stain. The tumour can be emptied slightly, but the proceeding causes pain. It is perfectly translucent. The child has convergent strabismus, noticed

since birth. The measurements of the tumour are $8\frac{1}{4}$ inches in a longitudinal direction, and 6 in a transverse.*

Feb. 3d. Since admission the tumour has increased in size, and the skin on the summit is thinner and darker. The tumour was tapped and a quantity of fluid drawn off with a small trocar. A solution of iodine in water (5ij.), consisting of one part of the former to two of the latter, was injected and left in the sac. A great deal of difficulty was experienced in passing the injection into the tumour.

Vespere. Has been very restless. There has been a little oozing of blood and serum, which has now stopped. P. 140. The tumour feels very hot.

4th. Has been very restless and cross. Has slept very little and been very sick. P. 164, running. The tumour is as large as it was before tapping, inclined to be red on the surface, and feeling hot to the touch. Bowels not acted.

5th. Has been extremely restless all night, and constantly crying out; this morning it was, according to the mother's account, convulsed. It refuses the breast almost entirely. There seems some slight difficulty in breathing; every now and then there is a catching inspiration, and there is spasmodic action of the alæ of the nose. Has a good deal of cough. P. weak and very quick, cannot be counted. The tumour is now larger than it was before the operation: it is tense and covered with patchy redness.

6th. Has been very restless, and still continues to refuse the breast, having only taken it once in the last twenty-four hours. The cough is very troublesome, and there are mucous râles over both lungs. The tumour is smaller and less tense. The child is very low. Vin. ipecac. ℥xx., sp. ammon. co. ℥xx., hst. ammon. cit. ʒjss.: cochl. min. 4tis horis.

7th. The child seems better, has not been so restless, and has taken the breast. Cough easier and less frequent. Tumour much the same.

8th. Is more fretful again. Tumour rather smaller.

9th. The tumour was examined carefully; it is as translucent as ever it was. On measurement it is found to be reduced $1\frac{1}{8}$ inch in one direction, $\frac{3}{4}$ of an inch in the other.

Discharged for a time.

22d. Re-admitted. The mother states that the tumour continued to increase up to the 17th, when it remained stationary for some days; it has rather increased the last day or two. The child has had a bad cough.

At present, the skin over the central discoloured portion is thinner and darker. The tumour is smaller and less tense than when she went out. Measurements are $5\frac{1}{4}$ inches in a lateral, and $5\frac{3}{4}$ in a longitudinal direction. The child seems weaker and more anxious.

* There is a coloured drawing by Dr. Westmacott of the tumour in the museum, which shows its size, relations, and partial transparency.

23d. The tumour was again tapped, and twelve drachms of a clear colourless fluid was drawn off. A solution (3ij.) of equal parts of water and iodine was then injected. 10 P.M. Has been very restless since the operation, and has not taken the breast. P. 130. A little redness of tumour.

24th. Has been very restless all night, and has not slept much. There is some tension, with considerable heat and redness of tumour. Has taken the breast once, but was sick after it.

25th. Has been much quieter and easier since two this morning. Less heat and redness of the tumour.

27th. Seems very well; is constantly sick, and will not take any nourishment. Tumour much as it was before the operation.

March 1st. Has constant cough. The mother thinks the tumour gets more solid.

5th. The tumour is rather increasing; it measures half an inch more in both directions.

8th. Child much better; cough gone, but the tumour is increasing. Discharged for a time.

April 5th. Re-admitted. Since the last note the tumour has appeared to increase. It now measures $6\frac{1}{2}$ inches in a longitudinal, and $5\frac{1}{2}$ in a lateral direction. The child is very ill, suffering from a rather acute attack of capillary bronchitis,—for which it was treated by the physicians, and from which it died April 10th.

On post-mortem examination death was found to have been caused by acute bronchitis, with consolidation in many parts of the lungs.

The tumour was carefully dissected, and a preparation was made of it, from which the appended drawings were taken. It will be seen that there are a few points in the case which are rather unusual, and some of which might have had considerable influence on the result of the treatment—if such treatment could have been carried out to its conclusion. In the first place with respect to the point of exit from the skull. It is well known that in congenital tumours of the occiput this point is usually behind the foramen magnum, through the expanded portion of the occipital bone, which is (at least sometimes is) developed by four centres. These four centres should coalesce during foetal life; and it is the failure or delay of such union which occasions, or allows, the protrusion. In the present instance, however, the protrusion occurred through the occipital foramen; and the arch of the atlas was also incomplete, so that the neck of the tumour was formed partly by the membrane occupying the place of this bone. Thus the tumour might be said to

partake of the nature of spina bifida. A case somewhat similar to this, at least as far as the mixture of spina bifida with cranium bifidum, is described by Bruns, *Handbuch der praktischen Chirurgie*, i. 718, from an author named Büttner, and is figured in the plates which accompany his work (Tab. xii. figs. 4, 5). In that case, however, the deficiency of the occipital bone was far larger, as may be seen in the plate, fig. 5, and a great portion of the brain protruded. Another case in which the atlas was bifid is also referred to by Bruns (p. 703). The case was observed by Bécларd, and is published in a paper by Breschet in the *Archives Générales*, 1831, tom. xxvi. p. 77; but as the case stands, there is no proof that the protrusion did really take place through the foramen magnum. The author says :

“There is seen *above* the foramen magnum, and distinct from that opening, a large round fenestra communicating with the cranial cavity, and formed at the expense of the occipital bone. A portion of the brain,—I presume the cerebellum,—must have projected from this hole. Some vertebræ still remained attached to the skull, and it is seen that the laminæ of these upper vertebræ were separated, and thus left an interval which again increased the free space by which the encephalon protruded from its natural cavity. This disposition of the laminæ of the vertebræ was like what is observed in spina bifida. A probe passed into the vertebral canal, and pushed into the cranial cavity, shows its extremity through the opening in the occipital bone, and the instrument thus indicates that the occipital foramen, properly so-called—and that which I have described—were quite distinct from each other.”

This case, then, seems to have been an instance of the coexistence of an encephalocele and a spina bifida in the same subject, rather than of their fusion into the same tumour.

I am indebted to the kindness of Mr. Hewett for calling my attention to a case in which the disposition of the parts more nearly resembled that which was found in the present instance. The case occurred in the practice of Mr. Palmer of Dublin, and will be found in the *Dub. Med. Press*, vol. ii. p. 381. A young man, æt. 18, was admitted into Mercer's Hospital in September 1839 with a fractured thigh, and a

severe contusion on the back of the head. There was violent pain in the head, and a tumour, soft, fluctuating, and with evident pulsation, was detected in the occipital region. The tumour was looked on as a blood-tumour, the result of the blow. I need not here detail the symptoms or treatment. Suffice it to say, that the symptoms were such as led to the repeated puncture of the tumour with a cataract-needle, and that the case terminated fatally. On examining the tumour, a distinct opening was detected in the occipital bone, in connection with the foramen magnum. This opening communicated with the fourth ventricle on the one hand, and the theca vertebralis on the other. All the ventricles were filled with a clear fluid, similar to that which had been evacuated by the needle.

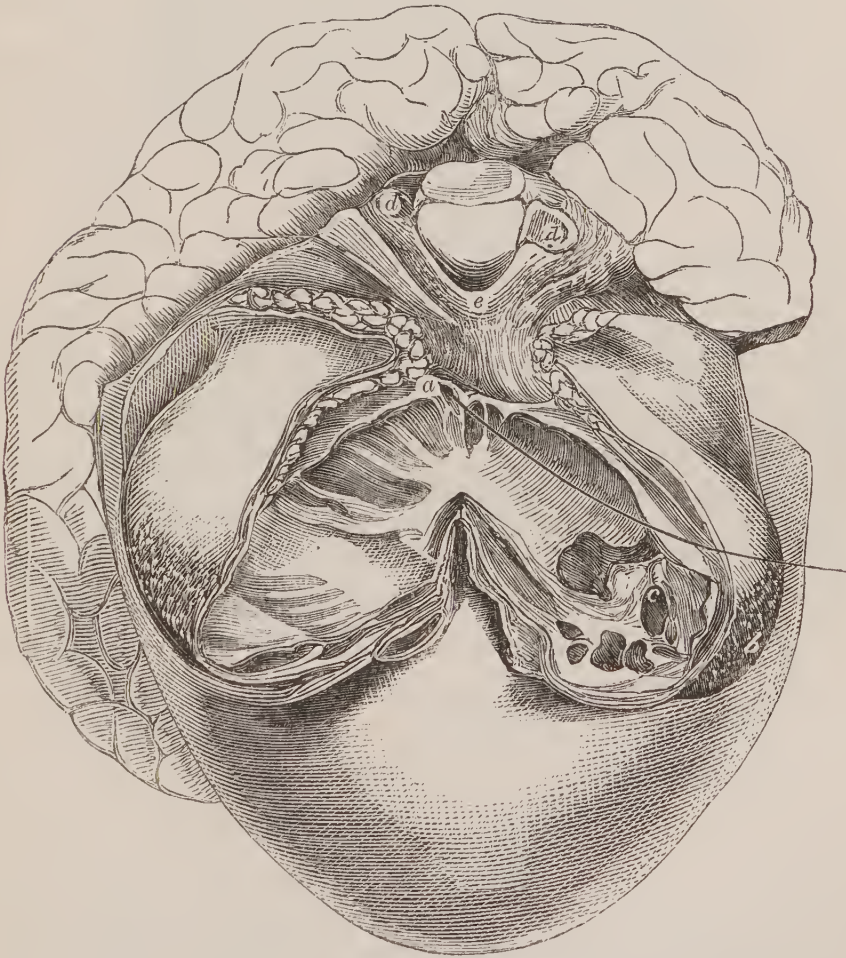
On post-mortem examination it was found that "a large plate of bone, forming a very singular shelf-like projection, was connected with the lower part of the occipital bone, extending (with the exception of a slight deficiency) from one mastoid process to the other. Immediately below, and in front of this deficiency, there was a distinct opening in the occipital bone between it and the first cervical vertebra, and in connection with the foramen magnum. This opening communicated with the cavity of the fourth ventricle on the one hand, and of the theca vertebralis on the other."

I conceive that this position of the hernial opening is more favourable than the usual situation, behind the foramen magnum, as affording less facility for the protrusion of a portion of the cerebellum.

Next, with respect to the contents of the tumour. It will be noticed that in practising the injection, though there was no difficulty in evacuating the fluid from the tumour, great resistance was experienced to the injection of the iodine. This made us suspect, what we afterwards found to be the fact, that the tumour was divided by septa into numerous different loculi. The loculi, no doubt, did communicate together, so that when the whole was equally compressed, as in tapping the tumour, there was no obstacle to the escape of their contents; but the various septa together opposed a considerable (not an insuperable) resistance to the limited pressure of the stream of fluid injected. These septa, formed

in all probability by an over-development of the cellular spaces of the pia-mater in some cases, and in others by folds of the dura-mater, the tentorium, &c., have been often noticed before, and form a part of all complete anatomical descriptions of such tumours. Thus Bruns (*op. cit.* p. 700) describes the hernial sac as occasionally divided into numerous partitions, only that he appears to regard these partitions as formed from the tissues of the scalp, which, as they are certainly, and even according to his own description, invested by the dura-mater, appears, to say the least of it, very improbable. The drawing (fig. 1) will show how numerous were these septa, and how small was the only communication which could be found with the interior of the cranial cavity, and through which a bristle is passed. This channel of com-

Fig. 1.



- a* Bristle passed into the hole leading to the fourth ventricle.
- b* Skin of the tumour, showing a naevous stain.
- c* Numerous septa dividing the tumour into loculi.
- d d* Bony portion of first vertebra.
- e* Membrane replacing the arch of the vertebra.

munication lay not in the centre, but quite close to the wall of the sac, so that the greater part, and probably the whole of the rest of the opening in the skull was blocked up by the membranous septa. Of course, under these circumstances, no protrusion of brain had, or could have, taken place. The whole opening, formed as it was by the foramen magnum and arch of the atlas, measured about $\frac{3}{4}$ in. in diameter. It was covered over by a quantity of fat and other soft parts, so that during life no information could be obtained as to the condition or nature of the parts protruded.

Finally, with respect to the parts within the skull. The small channel above referred to, and through which the bristle passed without the least resistance, led directly up into the fourth ventricle (as is seen in fig. 2); and this ventricle, and all the parts around it, were perfectly natural. One half of the cerebellum has been removed in order to show this. The third ventricle was also normal; but the lateral ventricles were greatly distended (as may be seen in the drawing), so as to be at least four times their natural size, and were filled with clear fluid.

I need add but little to the relation of this case. It is recorded here, more with a view to the formation of future experience on this subject, than as itself settling any point in the history or treatment of the disease. The treatment by injection appears, as far as I can judge, to have been a justifiable attempt to cure a disease which all who watched the case during life agreed in believing to be hastening to a fatal issue. We had kept the infant under observation for a considerable time, in order to determine this point, and had satisfied ourselves that the tumour was increasing every week, so that the imminence of convulsions or some other fatal mischief could not be denied. I am not disposed to question the general accuracy of the unfavourable opinion of operative measures in encephalocele, which Bruns has expressed in the following strong terms: "Operations have, as a general rule, subject to few exceptions, caused the patient's death. The greater number of them were undertaken in consequence of false diagnosis, and the few exceptional cases in which the operation, though undertaken from an error, yet terminated

luckily, can neither encourage nor justify the practitioner in choosing the same course in this affection when properly diagnosed."

The application of this rule to the sessile tumours containing brain would be questioned by no one; yet we had lately at St. George's a striking instance of successful operation on a tumour of this nature situated at the angle of the orbit. In the case to which I refer the operation was undertaken, as is generally the case, from a mistaken diagnosis, the

Fig. 2.



a The bristle appearing in the fourth ventricle.

b The falx cerebri—natural, and with well-formed bone beneath it.

c The parts cut away, to show the fourth ventricle natural and unexpanded. On the opposite side the section of the cerebellum is seen.

d The lateral ventricles greatly expanded. The choroid plexus is seen passing through the enlarged foramen of Monro.

NOTE.—The brain has become distorted, in consequence of part of it having been cut away on one side. Dr. Westmacott has faithfully copied this; but originally the two sides corresponded exactly.

patient having given an inaccurate history of the disease. Such lucky escapes have of course no influence on the rational treatment of the affection. But it is more to the purpose to note that the growth of a meningocele bears a great analogy to that of spina bifida, and that in the latter disease the injection of iodine has proved curative, that the same fluid has even been injected into the cerebral ventricles without ill effects,* and that in one case, at any rate, a meningocele (or perhaps an encephalocele) has been treated in the same manner with the result of certainly not doing any damage to the patient, and very probably arresting the growth of the tumour.

I allude to a case operated on by Mr. Paget at St. Bartholomew's Hospital. The patient was afterwards exhibited to the Pathological Society at the age of three; and the following notice of the case is extracted from the *Transactions* of that Society (vol. xvi. p. 12):

"During the first four months of life the sac appeared to be nearly transparent, and at the end of that time Mr. Paget tapped it, and evacuated a considerable quantity of fluid. Afterwards iodine injections were used on three occasions, and caused so much inflammation that serious consequences were apprehended. After this, however, the walls gave way, and a large quantity of fluid looking like dirty water was evacuated. Within twenty minutes the tumour refilled, and since that time nothing has been done." In this instance the disease was very probably checked in its course by the injection, though a cure was not obtained.

Another case of meningocele was under my care at the Hospital for Sick Children later in the past year. In this case the tumour was of such enormous size that it was obvious no treatment could hold out much prospect of benefit. Still I thought it justifiable to try the iodine injection, if only to acquire experience which might be used in a more hopeful case at some future time. The child, a female, was nine months old. It had been born with a tumour, the size of a bantam's egg, on the occiput, and this tumour had gradually increased till, on her admission into the hospital (Oct. 17, 1865), it was nearly as large as the head itself. The circum-

* *Lancet*, Nov. 3, 1855.

ference of the neck of the tumour was 11 inches, and of the largest part of it $16\frac{1}{2}$ inches. The child was healthy and sensible, and in fact differed in no appreciable degree from other children of the same age, excepting the tumour. I tapped the tumour three times (Oct. 25, 27, 30), injecting first ʒij. of an equal mixture of tinct. iod. co. and water; next ʒj. of the undiluted tincture, and lastly, ʒij. No fits or other bad symptoms followed any of the operations. After the second operation (Oct. 29) the opening made by the trocar gave way, and a considerable quantity of fluid escaped, but this did not give rise to any symptoms. The child was attacked with broncho-pneumonia on Oct. 28, which got rapidly worse, and she died on Oct. 31.

This latter case was not so instructive as the one which forms the principal subject of the present paper, for it was almost hopeless from the beginning. Yet it goes along with that case and with Mr. Paget's case to show that there is not much danger in injecting iodine into these tumours, while both in my case at St. George's and in Mr. Paget's case there seems good reason for thinking that the treatment checked the growth of the tumour. I should, therefore, be well disposed to give it a further trial.

In a case otherwise hopeful, if the iodine injection has had a fair trial and failed, ought we to venture on the removal of the tumour? I confess that I am very doubtful of the prudence of such a proposal, at least if I may judge from the cases which I have myself seen. In the case before us I had intended to have introduced the proposition to the notice of my colleagues, and to have discussed the propriety of making the attempt; and if ever the attempt could have been made successfully, it would be in a case like this, where the communication with the interior of the skull was very minute, and the parts cut through would have been separated by many folds and septa of membrane from the general subarachnoid cavity.* Yet allowing that the tumour had been successfully removed, would the tendency to hydrocephalic accumulation have been checked? I fear not. The same point is illustrated by a well-known preparation in our mu-

* I suppose it would be generally agreed that if the neck of the cyst is very large, and the communication with the ventricles very free, the operation would be too dangerous to be thought of.

seum (Ser. xvii. No. 2) from the head of a child who was under the care of Mr. James Johnson, and in whom a cyst exists on the vertex of the skull, which was in all probability originally a meningocele. This meningocele, however, has undergone a process of spontaneous separation from the cerebral cavity—the skull having ossified below it, and thus cut it off from all connection with the membranes. The cyst had been opened without any result. It was then proposed to excise it, and this could have been as easily and as safely done as in the case of an ordinary sebaceous cyst in the same situation. But the child suffered from extensive internal hydrocephalus, and died notwithstanding the closure of the neck of the meningocele.

These considerations would make me long hesitate (I do not say refuse) to perform any radical operation for the removal of a meningocele; but they do not, I think, contraindicate the attempt to stop its progress by injection. Such an attempt, if successful, would avert what is perhaps the chief danger to life, from the growth and over-distension of the tumour; while it is not impossible that the change in the secretive properties of the lining of the sac might extend to the ventricles, and the patient thus be relieved both from the meningocele and the hydrocephalus.

T. HOLMES.

IV. ON THE TYPHUS EPIDEMIC OF 1864-5,

AS OBSERVED AT ST. GEORGE'S HOSPITAL.



IN describing the features of an epidemic, it may at first sight seem unnecessary to record symptoms that have been established by previous observations ; but it must be remembered that such repetitions not only confirm the reports of previous observers, but establish the proper phenomena of the disease, apart from, or rather rendered more interesting by, such variations as are shown in occasional epidemics.

The great difficulty, in records of this kind, is to give a fair idea of the severity of the epidemic for comparison with those of other localities or times ; and without such an estimate a particular method of treatment may be unfairly condemned or upheld, by the fallacious conclusions from a death-rate derived from carelessly-compiled statistics.

For this reason the attempt has been made to record the cases, as far as possible, numerically ; including thus the rate of the pulse and respiration, and the heat of the body, measured by the thermometer in the axilla. The observations were made with regularity twice a-day, at the hours of nine in the morning and six at night, during the year 1864, and two months of 1865.

In 1808 Dr. Cheyne (as Dr. Sibson has kindly pointed out to me) recorded an epidemic which came under his notice much in this way : but his observations are apparently deficient in the regularity which has been shown by Professor Wunderlich to be of paramount necessity, and there is no attempt made to represent a systematic thermograph of the disease.

But it would take too much space to record all the observations that have been made ; and as a large number (83) were under observation, it seemed to me better to give a

typical instance of the fever, especially as the course in many cases was very regular. The great obstacle to recording every case arises from the fact, that in not a few the exact date of the first symptoms could not reliably be obtained, and consequently the day of crisis could not be given. It may be well to mention that the cases have been carefully sifted, and all doubtful cases have been excluded; only two cases were included without the characteristic rash of typhus, and these were children of parents previously admitted with well-marked typhus, the admission of the children having occurred a few days after that of the parents.

It was in the beginning of 1864 that this epidemic broke out in the neighbourhood of the Hospital, chiefly in the alleys of Chelsea; but other districts were also visited by it, and it raged severely from this time to the beginning of 1865. At the end of February I was prevented from completing my observations by a severe attack of the fever, and in this report therefore are included cases only from January 1864 to February 1865.

The patients admitted were of the poorest labouring class, dirty, ill-fed, living in crowded and squalid rooms; some without regular employment; many accustomed to supply the want of food by drink, and but ill-fitted to withstand the effects of so virulent a poison as that of typhus.

The total number of fever cases was 123 (including all cases caught in the Hospital); of these, 50 were females, 73 males. The number of deaths was 29; giving a per-centage of 23.6, or 1 for every 4.3.

The following table gives the ages of the patients, the number of deaths, and the per-centage of mortality according to decades.

Ages.	1—10	11—20	21—30	31—40	41—50	51—61
Admission.	10	44	26	19	20	4
Died.	0	7	4	5	11	2
Per-cent of Deaths. }	0	15	15	26	55	50

From this table it follows, that of all the cases admitted under thirty years of age the mortality was 14 per cent; over

this age, 42 per cent. Few as these statistics are, they tend to show what all other statistics of typhus represent—that typhus (speaking generally) is less fatal at an early than at a later period of life.

The generation of the fever-poison was traced, with some plausibility, in most cases to overcrowding. Families were seized with the fever who, it was ascertained, slept four, five, or seven in a room unfit for such a number. In isolated cases, where no previous case of fever was known to have existed, the same cause seemed to have given rise to the disease. A policeman was admitted who slept in the station with seven others, the beds being so close together that they could be easily touched by the arm. Other solitary cases were admitted from asylums and refuges where close packing existed.

The disease was communicated to ten persons in the Hospital: of these, five were patients; the others were three nurses, myself, and the night-superintendent—a most active and intelligent woman, whose loss was very much regretted. Out of these ten cases, two nurses, one patient, and the night-superintendent died. It will be well to mention that there is no special fever-ward in this Hospital; the cases were mixed indiscriminately in the wards. And as the question of separation or admission of fever-cases into the general wards of an hospital is one of much importance, a table* has been drawn up, giving the cubical contents of each ward, the number of fever-cases admitted, and the number of persons to whom (and in what ward) the fever was communicated.

The patient who died of fever caught in the Hospital took it from a single patient in a surgical ward, and is therefore not included in the following table.

To meet the exigencies of such an epidemic, where numerous cases of one kind are brought in, a special ward is, no doubt, best adapted; but for ordinary occasions there is much in favour of admitting fever-cases into general wards; but this precaution should be observed, that they be put at the end of the ward, and that other patients be strictly prevented access to them. By multiplying the foci of fever in a special

* See next page.

Ward.	Beds.	Cubic feet to each bed.	Cases of Fever admitted.	Cases of Fever caught.
Queen's	16	1269	26	1
Pepy's . . }	7	1151	0	0
Crayle . .	12	1249	7	1
Hollond .	12	1272	13	1
Roseberry .	12	1099	5	0
Fuller . .	12	1272	11	0
Hope . .	12	1099	3	0
York . .	14	1241	11	1
King's . . }	14	1265	47	5
Cambridge }	14	1218		

ward, the risk is very much enhanced for a patient in whose case an error of diagnosis has been made, and for the medical officers who attend the special ward; and unless each kind of fever has its own ward, what immunity can be expected for patients variously affected? One of the patients who caught the fever in the Hospital was originally admitted with measles; this was followed by scarlatina, and this again by typhus. Another patient, in like manner, originally admitted with scarlatina, was attacked by typhus; and a man admitted with typhus, at the end of 1864, subsequently died from a second attack of the fever. There is not a little difficulty in admitting statistics in the matter: it is easier to obtain evidence of the number of cases in which fever has been communicated in the Hospital, than to collect the numbers of cases in which errors of diagnosis have been made, and in which the patient has contracted the fever in special wards: and, in addition, to estimate the increased risk to medical officers and nurses which such special wards afford.

As to the propagation of typhus, it is extremely difficult to obtain any good evidence; but in two cases direct communication was established. In my own case the infection was attributed, and with much probability, to the inhalation of the breath of a fever-patient. It so happened that the cases

under notice during the previous week were convalescent, and I have a very distinct recollection of the disagreeable sensation of drawing-in the breath of a patient just brought in with well-developed typhus. This happened at six o'clock in the evening, and loss of appetite, headache, delirious dreaming, and insomnia, were produced within six hours, the characteristic rash being recognised at the end of the third day.

In the other case the man insisted on a similar sensation of inhaling the breath of a fever-patient, whom he was helping into a bath. The exact date was not ascertained in this case, but typhus-symptoms followed in a few hours.

The course observed by the fever was, with very few exceptions, extremely regular. Indeed, so uniform was the type, that in my own case, after ascertaining the appearance of the rash, I wrote down the day on which I hoped the crisis would take place; and I afterwards learnt that the critical sweat set in with some severity on that day.

The following symptoms ushered in the fever: rigors generally preceded, then came frontal aches, pains and soreness of the limbs, and pains of a very severe character in the small of the back, these forming a very prominent symptom, and resembling the back-ache of small-pox: vomiting occurred in a great many cases, nausea only in a still larger proportion; and while a confined state of the bowels was the rule, during the early days of the sickness, purging occurred in six cases; sore throat was present in two cases, epistaxis in one, and in one the disease was preceded by a succession of epileptic fits.

Many cases were not brought into the Hospital until the rash was fully developed; but in those cases admitted at the very beginning of illness the appearance of the rash was observed on the following days:

In 6 cases it was seen at the end of the 3d day.

„ 6	„	„	„	4th „
„ 7	„	„	„	5th „
„ 2 not until the	„	„	„	6th „
„ 2	„	„	„	7th „
„ 1	„	„	„	8th „

In my own case the spots were seen just coming out at the

end of the third day. As usual, there was a general subcutaneous mottling observed before the spots made their appearance, first seen, as a rule, on the back. During its early stage the rash was of a rose-colour, and might have been easily mistaken for the rash of typhoid, appearing sometimes first in the arms, generally on the trunk, sparing few parts of the body, and becoming darker as the fever advanced. Petechiæ were very frequently observed, and in one case were seen under the pleura after death. Generally the rash showed a tendency to fade at the beginning of the second week, recurring again with increased colour, and fading gradually as convalescence was established, though vestiges could be seen in some cases for weeks after the crisis.

In one case the rash was only observed for one day, and was not further developed: in two other cases, children whose parents were in the Hospital with undoubted typhus, no spots were seen. Occasionally the rash simulated other exanthemata, and might have been likened to measles, scarlatina, or even the early stage of small-pox.

The urine was generally found to contain traces of albumen at the end of the first week: it was not detected by me in cases of children under ten years of age. In seven cases it was found on the seventh day of fever; in four on the eighth day; and in one it appeared on the eighth, disappeared on the twelfth, and recurred in quantity on the fourteenth. The urine was generally scanty in quantity, very often muddy with lithates, and very often showed traces of uroerythine.

The stools were of the usual dark-green, fluid, and offensive character; and I am not aware that hæmorrhage from the bowels was ever observed.

Many observers have doubted the presence of a peculiar odour about patients suffering from typhus, and it is impossible to convey any idea of it; but I believe there is as characteristic an odour in typhus as there is in rheumatism or in small-pox.

The delirium present at the beginning of the second week was of the usual wakeful and restless character which has been previously observed; the symptoms becoming aggravated as the night advanced: it was not often that the patients required restraint, though they were excited and unwilling

to remain in bed, but the delirium was not of that extremely violent form which, as far as my small experience goes, seems to be more characteristic of typhoid fever.

The cough was a distressing and an early symptom, and the rate of respiration was always increased, being accelerated as the disease advanced; it ran from 22 per minute to between 30 and 40 during the first week; during the second week it ran from 30 to 40 per minute, and even reached 52, with a favourable issue, a slight diminution being observed at the time of crisis. The lungs recovered their natural rate slowly, and no sudden recovery was manifested by a rapid diminution in the respirations. It must be remembered, however, that the lung-rate may be increased from diarrhoea alone, and is consequently not to be taken in all cases as a measure of the injury from which the lungs are suffering. The curve of the rate of respirations in this epidemic would be represented by a regular and gradual curve, regaining the line of health at the same angle with which it left it.

The rate of pulse has been tabulated in a similar manner, the observations being made regularly as before mentioned at 9 A.M. and 6 P.M. During the first week the usual rate was from 100 to 120; 140 would have been high for so early a period: in three instances the pulse at the end of the first week was a little over 130 in the minute, two of which cases died. The lowest rate observed during the first week was between 80 and 90, an average of 83 being maintained during this time. In the second week the pulse was accelerated and enfeebled: it seldom rose above 140, and was usually between 130 and 140, the highest amount attained being about the period of crisis: in one case it beat 160 times in the minute, with a favourable result; this, however, was an exceptional case. When the crisis took place, with diminution of pulse as well as of heat of the skin, a fall in the pulse-rate was observed, sometimes of 16, 22, 24, or even 30 beats per minute in the fifteen hours: these were the most favourable cases, and I consequently looked upon the continuation of a high rate of pulse as an indication that some complication existed, or some sequela was threatened. The crisis was observed with much regularity, and was always indicated by a fall in the mercurial column. Generally the pulse-rate diminished

at the same time; and this crisis was in a most marked manner ushered in or attended by very profuse sweats, which formed a peculiar feature of the epidemic. These sweats were sometimes preceded by transient diarrhœa, occasionally accompanied by sudamina, and often lasted three days. The crisis seemed to have some reference to the 12th day; that is, it would occur between the 11th and 12th or between the 12th and 13th, or might be postponed to the 14th, but the usual time was at the end of the 12th day.

The sweats should be noticed, as forming at least one point of difference between the epidemic observed here and that observed in Glasgow by Dr. Gairdner.

The curve which would represent the pulse-rate during the course of the fever would resemble the path of a missile through the air, the termination being rather abrupt, and more so than in the case of the lung-rate; not, however, so marked as in the curve indicated by the thermograph. But acceleration of the pulse cannot be depended on as occurring invariably in cases of typhus. One instance of exception has been already mentioned; and in my own case the pulse was comparatively quiet, about 90 per minute, while the thermometer indicated great increase of heat. Again, acceleration of the pulse to some extent may exist without the presence of one of the continued fevers; and practically the thermometer was found to give the most satisfactory evidence of the true nature of the case in either instance.

The increase of superficial heat in typhus takes place very rapidly after the first symptoms of poisoning, and there is an exacerbation towards night, the temperature falling in the early morning: the scale of heat ascends higher and higher up to the fifth and sixth days, when the maximum height (in favourable cases) appears to be reached: a slight diminution then takes place, and the temperature remains pretty steady until the day of crisis, when a sudden and rapid fall is observed to take place, in the most favourable cases, to a little below the standard of health, where it remains with very slight variations for weeks. For some months afterwards I found that my temperature was not so high as before I was attacked by the fever. A chart, or thermograph, has been drawn up, representing the general course of a favourable case during

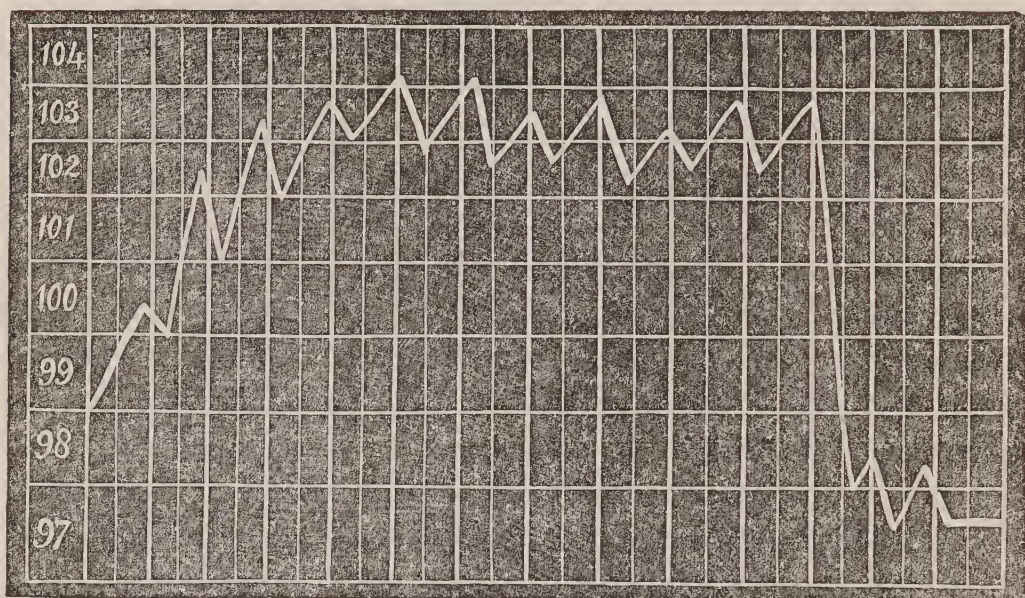
this epidemic. This thermograph is (as Professor Wunderlich pointed out originally) quite distinct from that of other diseases. Many diseases are distinguished by other means; but some interest attaches to the distinction between the unspotted varieties of fevers, as to what class they belong; and typhoid fever differs from typhus in giving great oscillations of temperature between morning and night at the period of convalescence, instead of falling rapidly to the normal standard.

Some sort of prognosis may be made from the observations of the fifth and sixth day of typhus: if the morning temperature be above 104, a severe attack of fever may be expected, and if the temperature gradually increases during the second week, a fatal result must be anticipated; but this increase must not be a transient aggravation from some special cause, but one continued for a sequence of days, and then the thermometer may be trusted to, anticipating the pulse-evidence by hours and even days. 105° Fahr. is a dangerous temperature for the second week; the highest I have seen reached was 108·5°; this was observed three-quarters of an hour before the patient died.

There are some causes that produce a fall in the mercurial column: great cold, for instance. On one day when a severe frost rapidly set in, the temperature was diminished in six patients who happened to be then under observation: in one case the catamenia came on in mid-fever at noon; the morning temperature was 102·5°; the evening temperature, instead of being 103·5° or 104°, was 102·3°. A similar effect I have also observed produced by diarrhœa, or the emptying of a full bladder. All these observations are mere verifications of those so laboriously worked out by Professor Wunderlich.

In the most favourable cases, as I have said, the crisis took place rapidly, often between night and morning; but in less favourable instances, which were not the rule, the crisis might be delayed over a day, and the fall would be more gradual. In one peculiar case of typhus lately admitted into the Hospital, where the boy had been subject to epileptic fits, and on admission had scarcely any pulse at the wrist, large doses of alcohol had to be given (with a satisfactory result); but the crisis was delayed over six days. This was a very peculiar case.

Subjoined is the thermograph of a favourable case during this epidemic; the observations being made, in the axilla, at the hours of 9 A.M. and 6 P.M.



The following were the sequelæ observed: swellings of the parotid and submaxillary glands in three cases, and one instance of each of the following: inflammation of shoulder-joint, abscess of ankle, otorrhœa, carbuncle, menorrhagia, phlegmasia dolens, albuminuria (not persistent), peritonitis, and the development of tubercles in the lungs, and a remarkable case of softening of the spinal chord, with two cases of abortion during the course of fever, one at three months, and the other at five; neither ending fatally. Bed-sores occasionally made their appearance, and it is not easy to appreciate thoroughly the discomfort they produce, unless after actual experience. It is no small matter to be deprived of one chance of changing the position in bed with the certainty of being aroused from sleep by the pain of turning on the sore. There is no doubt, as Dr. Murchison observes, that this delays convalescence considerably.

Various drugs were given: ammonia and potash, salines, quinine in large doses, hydrochloric acid, carbolic acid; but none seemed to have any effect on the general course of the fever. Beef-tea and milk, in quantities of about two pints of each per diem, was the ordinary diet; but it occasionally happens that a patient cannot take, or is nauseated by, one or

both. A fever-patient, notwithstanding the general idea of his powers of discriminating food, very often requires as much coaxing as any other invalid; and sometimes the obstinacy with which he refuses his food, and which is generally attributed to the effect of the disease, is due to the nausea arising from an unvaried dietary.

The question of the use of alcohol in typhus is one which, in my opinion, statistics will not be able to decide; nor should they be used for the purpose, unless such statistics are compiled, as the generality certainly are not, in an elaborate manner. I am so loth to send loosely-collected numbers which may be used in more than one way, that, although I have taken the trouble to tabulate the quantity of alcohol given in each case, I have thought it better merely to tabulate those cases where the day of fever was ascertained on admission, and consequently the day of crisis; the important (to my mind) fact to be ascertained is the quantity of wine given before the crisis takes place. There may be some excuse for producing symptoms of intoxication during the height of a fever, without recognising their true nature: there can be none for producing such effects during the defervescence. And the amount of alcohol that will produce this effect will not be learnt by the use of statistics; the idiosyncrasies and previous habits of the individuals entirely prevent this. The only way of arriving at a right conclusion on the use of alcohol in fever is to watch its effects in individual cases, and to become thoroughly acquainted with the first indications of its abuse.

I am fully persuaded that less wine will be used in fever than has been hitherto; one of the worst cases of typhus admitted during this epidemic was treated without any alcohol, and made a rapid recovery; and in the cases of children and young persons I have seen even small doses of alcohol produce very bad effects. Occasionally, and in the cases of habitual drunkards, an attack of delirium tremens followed the crisis of the fever. By means of the thermometer it was easy to recognise when the fever abated, and the subsequent disease took place. After the fall in temperature, very curious and irregular vagaries were observed to take place in the thermograph, the pulse-rate during the attack remaining high.

In the following table will be found a list of cases where

the day of fever was ascertained at the time of admission, with the amount of alcohol (of brandy or port-wine) per diem given in each case, with the day of commencement, the quantity being reckoned in ounces.

I have also given the few instances where no wine was given under similar circumstances :

Sex.	Age.	Day of Admission.	Average Wine per diem.	Total Wine.	Average Brandy per diem.	Total Brandy.	Crisis.	Days in Hospital.	Total days of Fever.
M.	5	8	4 from 13	132			13	43	51
M.	10	6	4 from 6	52			9	21	27
M.	12	8	4 from 8	108			13	27	35
M.	16	8	6 from 9	90			13, 14	34	42
F.	18	8	4 from 10	100			13, 14	28	36
F.	18	8	6 from 14	84	4 from 11	32	12	29	37
M.	18	8	10 from 9	210			12	27	35
M.	19	9	8 from 9	188	6 from 15	90	12	43	52
M.	19	12	6 from 12	90			13	17	29
M.	19	1	8 from 5	184			11	27	28
M.	20	9	10 from 27	210	6 from 21	222	13, 14	39	48
M.	23	9	8 from 11	246			12	32	41
M.	24	6	8 from 6	400			14, 15	28	34
M.	25	8			4 from 12	76	13	35	43
M.	28	7	10 from 23	138	6 from 10	96	13	37	42
F.	33	1	7 from 1	105	6 from 9	42	11	35	36
M.	33	9			6 from 9	78	13, 14	34	43
F.	38	7	12 from 10	276			12	28	35
M.	42	4	4 from 5	252	6 from 10	90	11	47	51
M.	42	1	10 from 5	264			13	30	31
M.	45	4			4 from 6	116	11	35	39
M.	61	1	6 from 4	192	6 from 5	84	12	36	37

No Wine given.

Sex.	Age.	Day of Admis- sion.	Crisis.	Days in Hos- pital.	Days of Fever.
M.	9	7	11, 12	22	29
M.	9	5	8	18	23
F.	14	5	11, 12	35	40
M.	18	8	11, 12	23	36
M.	20	11	12, 13	34	45

It should be mentioned that of the fatal cases, two were complicated : one with aneurysm of the subclavian artery, for which the patient was originally admitted, and the other with extensive disease of the aorta. The average time of sojourn of the patients that recovered was thirty-four days, the average duration of the illness being forty-two days. Below is a table which may be taken as fairly representing the course of the fever in a typical case of an adult :

Days.		Pulse.	Lung.	Temp.
First day . . . {	M.	90	24	99
	E.	96	24	100·5
Second day . . . {	M.	100	26	100
	E.	103	26	102·5
Third day . . . {	M.	104	28	101
	E.	108	30	103
Fourth day . . . {	M.	108	30	102
	E.	116	30	103·5
Fifth day . . . {	M.	110	30	103
	E.	112	32	104
Sixth day . . . {	M.	115	30	103
	E.	117	32	104
Seventh day . . {	M.	118	32	102·5
	E.	120	34	103·5
Eighth day . . . {	M.	120	34	102·8
	E.	125	36	103·8
Ninth day . . . {	M.	120	38	102·4
	E.	125	38	103·1

(Table continued.)

Days.		Pulse.	Lung.	Temp.
Tenth day . . . {	M.	124	38	102·6
	E.	129	40	103·5
Eleventh day . . {	M.	130	44	102·8
	E.	132	45	103·5
Twelfth day . . . {	M.	112	40	98
	E.	103	40	98·5
Thirteenth day . {	M.	100	36	97·5
	E.	88	36	98·5
Fourteenth day . {	M.	80	32	97
	E.	80	30	97

REGINALD E. THOMPSON, M.D.

V. NOTES ON AN EPIDEMIC OF TYPHUS AT LEEDS, IN THE YEAR 1865-6.

THE importance of my subject, rather than the value of my experience, emboldens me to occupy a few pages of this volume with some account of the above epidemic, as treated in the Fever Hospital at Leeds. There are few subjects which meet with a more favourable reception by medical readers than that of the nature and treatment of fevers; and it is in this belief that I venture to note down the few facts in my experience, which seem to be worth reporting. I wish, however, at the same time, to avoid any repetition of those more general facts, which are already made known in the admirable writings of Jenner, Murchison, and other able physicians. Most modern physicians have a strong instinctive or intelligent belief that in the right understanding of fevers we shall find a key to the classification of a vast number of morbid phenomena. Fever is to function what inflammation is to structure; both are expressions of very wide generality, and will deserve all the study they are receiving, until we thoroughly comprehend the generic uniformity which underlies their special diversities. When we have learnt the relationships of fevers the one to the other, and have grouped them in classes of greater and less affinity; when we have learnt also the determining causes of their diversities, as found in climate, food, and other varying conditions; we shall for the first time have gained a real insight into the natural history of disease. We are now but just awaking from the metaphysical delusion that diseases are separable entities; and have scarcely rubbed our eyes free from the tendency to see in each disease, or even in each stage of a morbid process, a fixed species, having no genetic affinities to any other. The Darwin of medicine has yet to arise who will point out the

divergences of morbid actions, and the progressive evolution of various morbid states, and who will refer to their proper series all those separate phases of many disorders, which, as they follow one another, not at one time, or even in the same life, have to us a fragmentary aspect concealing their community of nature.

Pathological anatomy, or the accurate description of particular morbid states, has now been well worked. What we have to seek is a point from which we may obtain a perspective view of these states, and so perceive more fully their mutual bearings and interdependencies, their varying periods, and their order of succession. Our present fear of flashy generalisations is becoming enough; but we must not forget that there is danger also in creeping after details too exclusively. Classification is both the organ and the expression of the progress of biological science, and its functions are as important in the pathological departments as in any other.

In reasoning from the less to the greater, we obtain much knowledge from observation of fevers proper, which present themselves to us as maladies, attended with prominent febrile disturbance, having definite stages and periods, and completing a cycle of change, not in months, years, lifetimes, or generations, but in a few days or weeks. A continued fever is a malady which has no necessary attachments to previous states of the patient; we can define its beginning, and in most cases its end, without risk of severing any chain of necessary antecedents in the individual. It is thus of high importance to know the natural course of such a malady, and for this end to guard its evolution as far as possible from all accidental disturbance. With this view I undertook, on the 1st of October last, when typhus was epidemic in Leeds, to place all our cases in the Fever Hospital under conditions as uniform as possible. By the kindness of my colleague, Dr. Chadwick, the whole house was placed under my charge, and a rigid system of treatment laid down. This system has been carried out now for eight months with unwearied care and skill by Mr. Libbey, the resident medical officer; who was ably assisted at times by the late Mr. Swann and by Dr. Bramley. Unfortunately the terribly infectious character of the epidemic has broken in sadly upon the regu-

larity of note-taking. Leeds had long been free from typhus, and few persons were protected by previous attacks. Happily our matron and two head-nurses were protected, but Mr. Libbey took the disease in its gravest form, and Mr. Swann, who courageously filled his place, sickened and died. Under these circumstances, nothing could justify my keeping the medical officers at the bedsides, or in the post-mortem room, longer than necessary; and the elaborate returns I hoped to make are now impossible. I trust I am not wrong in thinking that some of the results which I have obtained are worth publication.*

Happily for Leeds, a good Fever Hospital, containing nearly one hundred beds, was built some years ago, in an airy situation outside the town; and has very wisely been kept in order, so as to meet any chance epidemic. The typhus which invaded most English towns last year fell early and heavily upon Leeds, which is a very backward town in all sanitary arrangements. Our Hospital is built on the corridor plan, with wards on one side and windows on the other—an arrangement only inferior to the pavilion plan. Now, on both theoretical and practical grounds, I had long been convinced of the great remedial power of fresh air in fevers; a belief strongly supported by a remark made to me, I think, by Professor Rolleston, that in the Irish fever many persons laid out on the roadsides to die, unexpectedly recovered, to the great

* That with such intentions I have only succeeded in contributing to our knowledge of the average mortality of typhus may disappoint the reader. At the same time the investigation of averages in disease is of the greatest importance. Dr. Bennett's industry in this department is worthy of high praise; but his method, as Dr. Barclay has pointed out, is so deficient, that I fear his results will be valueless. Two profound errors vitiate his method. The first, that he does not secure uniformity in the facts to be registered; the second, that instead of eliminating all possible disturbing causes, so as to allow of a more complete mutual neutralisation of residual disturbances, he actually begins by giving prominence to that which is itself a great disturbing cause, viz. treatment. Under the loose generic name of Pneumonia, for instance, many most diverse groups of facts are included, and treatment is a separable accident which should be eliminated as far as possible. Cases so obtained, even if true, would, as Dr. Barclay well shows, be inapplicable to individual cases; and as they will certainly be untrue, they will be doubly inapplicable. On the other hand, Dr. Barclay scarcely acknowledges sufficiently the vast importance of statistics in the discovery of the general laws of diseased processes.

discomfiture of their heirs-at-law. I determined, therefore, on the 1st of October 1865 to give the open-air system a thorough trial, and ordered that the windows, both of wards and corridors, should be open night and day. I believe my experiment was thoroughly tried. Though in the habit of going into the wards at unexpected times, I seldom or never found the windows shut; and Mr. Libbey, who was continually in the wards night and day, took great pains to see my wishes obeyed. The principal nurses, moreover, I could thoroughly trust; and the fear of infection throughout the establishment was such as to make all servants willing to inconvenience themselves in the matter of air.* Patients who complained of cold were supplied with more bedding; and although the air in the wards was generally sufficient to stir the hair upon the head, we seldom saw any bronchial or similar symptoms. Until the east winds set in, I find only two cases complicated with lung affection; and both these recovered. During the spring we have not had more than our usual average of bronchitis for that period of the year. The next points of importance are the nursing and nourishment. These have been constantly observed and regulated according to the best modern practice, and required little revision. The nurses give food regularly and frequently according to the needs of the cases, and report on the quantities taken, so that the beef-tea, milk, &c., may be supplemented, as required, by brandy. The best cognac brandy is the only stimulant we now use in bad cases, my colleague and myself being convinced of its superiority to all other forms of stimulants. In low and prostrate cases, however, we often find much help from ammonia and from camphor. Eighteen and twenty ounces a-day even of cognac are not infrequently required in cases of the kind sent into a fever hospital; and we begin to stimulate very early in a certain class of cases, which we recognise in the first week by a peculiar softness of pulse. From the 1st of October, having no faith in the reported good effects of courses of medicines in fever, having tried many and been disappointed with all, I crossed out of our

* Our visitors frequently remarked of their own accord upon the great freshness of our wards, even when filled, as they too often were, with more than the regulation number of patients.

system all medicine except as laid down for particular states. I was thus able, without injustice to the sufferers, to bring my experience down to terms of greater simplicity. The majority of patients had no medicine at all. To those who were conscious enough to be critical we dispensed coloured water, pleasantly acidulated; when we disturbed the rest, we gave them food. To say, however, that I put no trust in drugs would be to refuse an acknowledgment to agents to which I attribute much saving of life. Three drugs we constantly used — opium, antimony, and camphor; occasionally also ammonia.

It is difficult for me to say, without apparent exaggeration, how important a part I believe opium to play in our remedial system. We date a marked decrease of our mortality from the day that the windows were all thrown open; on which day also an order was given that no patient was to pass two sleepless nights running, if opium could prevent it. One year ago I looked upon opium in fever with much suspicion, granting its occasional value only, and greatly restricting its use. Gradually my fear of the restlessness overpowered my fear of the opium, and I have now ceased to regard the latter with any great apprehension. Continually I have witnessed the terrible havoc which a night's tossing makes in a little reserve of strength. Two such nights reduce it to a most precarious level, and few patients outlive three. On the other hand, though I and my assistants have for six months been giving morphia at all stages of the fever to combat sleeplessness, I have never yet seen mischief result. I have never seen the power of taking food suspended by it, or the oppression increased. On the contrary, I have continually seen with pleasure how, on the morning after opium has brought sleep, even during the first few days of the disease, the tongue has become moister, the headache less, and the countenance more open. The sleep of an opiate is better than no sleep.* Camphor is a great favourite of ours also; we find, on the whole, that no medicine equals it in the low

* The quantity of morphia to be given depends much, of course, on the patient. I seldom, however, venture upon more than a grain or a grain and a third, for fear of collapse, and this in divided doses. Of course opium is withheld when any tendency to coma is seen. Where, however, as is not infrequent, convulsions of a tetanic order appear, we use opium often in

delirium often connected with feeble heart.* We combine it with opium in low delirium, accompanied by sleeplessness. Perhaps, however, the most striking in its immediate effects of all the medicines which we have used is that which we familiarly call Graves' medicine. The combination of antimony and opium in the wild delirium of fever is advised by Graves in a well-known passage of the *Clinical Medicine*; and a marvellous remedy it is. Half a grain of morphia combined with one-third or one-half of a grain of the tartar emetic, with repetitions of half the dose, if necessary, will bring quietness and sleep to a patient who an hour or two before was a raging maniac, leaping from bed, and destroying all he could lay hands upon. Such patients far too frequently die of exhaustion; and many did die until we made a regular practice of giving the morphia and antimony. These, then, were our measures:

1. An unusual supply of fresh air night and day throughout the hospital, all fear of draughts being disregarded.†

2. Regular nursing and feeding, and the use, when necessary, of the best cognac brandy in addition.

3. Prevention by morphia, if possible, of a second sleepless night, at whatever stage of the fever it may be threatened.

4. The use of a combination of camphor and morphia in low delirium.

large or repeated doses with the happiest results. Such convulsions appeared and continued from time to time during the 9th, 10th, and 11th days of the fever in the case of our resident medical officer. They were controllable by opium to some extent; and by its unsparing use I believe his life was saved. Under treatment by blisters, purgatives, &c. such patients, as far as I have seen, invariably die. I have not found that a weak or fatty state of heart is a bar to the cautious use of opium, though in such cases I always combine it with camphor and other stimulants.

* Except musk, the happy effects of which in similar cases I saw in Paris. I use camphor as a substitute for that expensive drug. I am told that Dr. Murchison speaks very highly of camphor. His testimony would be far more valuable than mine, and I regret that I have not his book at hand for reference. I learnt the use of it from Trousseau.

† In talking over this matter with my friend Dr. Richardson, he proposed to me to heat the air, before admitting it into the wards, to 70° or even 80° Fahr., in the hope of making it stimulant as well as restorative. The experiment is one well worth trying. There is, however, no fear of increasing collapse by cold fresh air, if plenty of clothing, hot bottles, &c. are supplied. Many cases admitted in collapse from hot frowsy homes revived in our wards.

5. The use of a combination of tartar emetic and morphia in wild delirium.

The class of cases which we had to treat were true maculated typhus, often presenting a very full dusky rash and great prostration. The large majority of them were sent in by the guardians of the poor, and were of the lowest order of the people.*

Such, then, were our patients and the conditions under which they were placed; the following were our results:

In the quarter commencing October 1st, 1865, and ending December 31st, we admitted 325 cases of typhus;† of these the total mortality (omitting one case found on post-mortem to be acute cerebral softening) was 13·11 per cent.

The mortality, excluding all cases which died within 24 hours, was 12·9 per cent; within 48 hours, 10·19 per cent; and within 72 hours, 8·002 per cent.

Those who have to do with fever-hospitals know how frequently cases are admitted in a dying state. Under good nursing and stimulants these cases are often kept alive one, two, and three days, or even more, if young persons. Such cases, though swelling the mortality, really never come fairly under our treatment; and I have a strong conviction that if we received all our cases at the beginning, the proper mortality of typhus, at the usual average of ages, would be shown to be not more than 7 per cent.

My endeavours to make an age-table have not been successful enough for publication; the ages have often been omitted in the hurry of admissions; and moreover many pa-

* By this I do not mean to imply that our cases of fever occurred in the worst possible subjects. Coming from destitute and over-crowded dwellings they often showed symptoms of alarming prostration; over which symptoms, however, opium and brandy clearly had some control. The cases which I saw in private practice were on the average of a more dangerous kind, and the mortality higher. In persons accustomed to live by use of the brain the weight of the disease often fell upon that organ, causing cerebral and cerebro-spinal disturbances of an unmanageable and inealeulable character, which tended to death. Among those who lived by bodily labour, and had no brains to speak of, the disease fell chiefly upon the muscular system, causing failure rather at the heart, and general animal and organic prostration; symptoms more easy to combat, and more easily foreseen in their variations and issues.

† The admissions of enteric fever were few, and are left out of account, as are all cases of scarlatina, small-pox, &c.

tients are sent in unable to give any account of themselves, and die before they can be catechised. Roughly speaking, however, I must set off against our favourable figures the rather large proportion of young cases which we received. About 116 cases seem to be registered of twenty years of age and under: of these we only lost about 5 per cent; of thirty years* and over twenty we admitted 143, of whom we lost 14 per cent (strictly 13·08, but I cannot be sure of absolute accuracy, as explained above); from thirty years and upwards the per-centage of deaths rapidly increased, according to a well-known law of typhus. Many of the old people never came fairly under treatment, but died within forty or fifty hours of admission.

In the four months beginning January 1st, 1866, we admitted 301 cases, of which we lost on the whole 17·5 per cent. This is 4 per cent higher than during the winter quarter of 1865, as a larger number of cases died soon after admission.

The mortality, excluding all cases which died within 24 hours, was 15·2 per cent; within 48 hours, 11·6 per cent; and within 72 hours, 8·6 per cent.

It was a very pleasant surprise to me to find this last number almost identical with that obtained in 1865. The two calculations were made at intervals of three months, and the coincidence was quite unexpected. It is gratifying to find that the per-centage of those cases which came fully under treatment is so far a constant quantity, as it best gives us the measure of success, and the best information of the natural mortality of the disease when placed under proper care.

Out of the great heap of patients' papers before me I will now append two or three cases taken almost at hazard.

M. E. Morn, æt. 19. Admitted March 27, 1866. Illness began March 20th.—March 27. Tongue red and dry; eyes bloodshot; P. 130, soft, feeble; much rash. Ordered beef-tea, &c.; brandy $\bar{3}$ vj.—March 29. Great pain and heat of head; eyes much injected. Ordered emp.

* Those engaged in hospital practice know how often the age is given as a round number, a certain subtilty of mind for the appreciation of delicate shades of time being absent. Of the number of our cases entered as æt. 30, many, no doubt, were one or two years older. Had I taken 29 as the further limit, the per-centage would have appeared less by one or two per cent, or even more.

lyttæ nuchæ; brandy $\bar{3}x$.—30th. Eyes clearer; head less hot; low delirium. Camphor. gr. ij. in pil. 4tis horis. Wet cloths to shaved head; brandy $\bar{3}xij$.—31st. Tongue moister. From this date she gradually improved.

Ann Dixon, æt. 23. Illness began March 7th. Admitted March 22d. —Tongue dry and brown; mouth filled with sticky mucus; lies prostrate in bed: dyspnœa great; P. sharp and weak, 120. Beef-tea, &c.; brandy $\bar{3}vj$.—23d. Night sleepless, worse. Morph. gr. $\frac{1}{2}$.—24th. Tongue not so dry; drinks with difficulty; P. 130, very feeble. Brandy $\bar{3}viiij$.—27th. P. 140, very feeble; low delirium; tongue dry and hard. R camphor. gr. iv.; morphia gr. $\frac{1}{12}$, 4tis horis; brandy $\bar{3}xiv$.—29th. Symptoms relieved. Tongue moistening. Improved from this date.

Ann Jenkinson, æt. 21. Commencement of illness uncertain. Admitted March 31st.—April 1st. Tongue brown; P. 120, very weak. Beef-tea; brandy $\bar{3}viiij$.—April 2d. P. 150, very small; low delirium. R pil. camph. c. morphia 4tis horis; brandy $\bar{3}x$.—April 3d. Tongue still dry and brown, but moistening at edges; P. 130. Slept better. Improved from this date.

Thomas Norris, æt. 20. Admitted January 4th, and put on brandy $\bar{3}viiij$.—January 5th. Wild delirium; confined in strait-jacket in the evening. R morphia and antimony draught by teaspoonsful till sleep is obtained.—Jan. 6th. Took three doses (= morphia gr. jss.; tartar emetic gr. j.); and slept towards morning. Improved from this date.

George Southwood, æt. 40. Admitted May 12th. Ill a week.—May 13th. Typhus symptoms well marked; delirious at home for some days. Wife died of typhus. Gets out of bed; is violent. Much rash coming out. Morphia and tartar emetic $\bar{a}a$ gr. ss. statim; brandy $\bar{3}viiij$.; beef-tea, &c.—May 14th. Has slept well, and is quiet; P. 120.—May 15th. Much worse during the night again; P. 130; tremors. Brandy $\bar{3}xiv$.—16th. Very low; all passed under him; can scarcely swallow. Egg-flip.*—17th and 19th. Some improvement; P. 120; tongue moistening a little.—20th. Pulse 90; intermittent; feeble; kicks the clothes off.—Died 21st. Death probably due to heart-affection. No post-mortem reported.

Mark Fountain, æt. 19. Admitted March 19th. Ill a week.—Tongue moist; P. 100; no rash; rambles, and gets out of bed; ill-tempered. Brandy $\bar{3}viiij$.—20th. Rash coming; tongue dry; P. 100; very delirious. R tartar emetic, morph. $\bar{a}a$ gr. $\frac{1}{4}$, 3tis horis, till sleep is obtained; brandy $\bar{3}xij$. Took three pills, and slept at four o'clock A.M.—21st. Violent again this evening; plenty of rash; tongue dry and furred; gets out of bed; P. 120. Repeat pills; continue brandy.—22d. Much rash; vomits a little (caused by the antimony?). Has slept, and is better.—23d. Tongue moistens, and improvement sets in from this date.

* No medicine is like egg-flip for prostrate patients, especially for the older people.

In conclusion I shall add equally brief notes of a few cases in which the thermometer was used.

William Dufton, æt. 17. Admitted April 11th. Ill three or four days.—April 12th. Heavy and listless; tongue dry; gets out of bed. Beef-tea, &c.; brandy \mathfrak{z} vj.—13th. Rambles still more; no rash. R morph., tartar emetic, $\mathfrak{a}\mathfrak{a}$ gr. $\frac{1}{4}$ in pill.; brandy \mathfrak{z} vij.—17th. Has been quieter; otherwise is much the same. Heat (Fahr.) 103° ; tongue dry; P. 120.—18th. Heat 101° ; otherwise much the same.—19th. Much better. Heat 98° . Improved from this date.

Susanah Pybus, æt. 21. Admitted April 13th. Ill a week.—Tongue dry and brown; typhus rash; purged; tender abdomen.—April 14th. Heat 101° ; otherwise as yesterday.—15th. Heat 103° .—16th. Much typhus rash; persistent; eyes bloodshot; heat 97° .—17th. Tongue moister; less oppression; heat 100° .—18th. As yesterday.—19th. Heat 97° ; more sensible; rash fading.—20th. Heat 100° and 101° .—21st. Not so well; tongue dry and clogged; heat 100° .—23d. Heat 97° ; otherwise no change.—24th. Improved from this date.

Mary Ann Snee. Admitted April 17th. Ill a week, of typhus.—April 18th. Tongue dry and brown; heat 100° .—19th to 24th. Heat 100° and 101° . On the 24th the heat fell, and improvement set in.

Elizabeth Snee. Typhus.—April 20th. P. 112; skin hot; tongue dry; heat 102° .—21. P. 120; heat falling; heat fell for next two days, when improvement began.

Henry Wales, æt. 38. April 20th. Prostrate with bad typhus; heat 102° .—23d. Heat 102° ; much petechial rash; very ill; P. 130.—26th. P. 140; tongue dry and red; heat 101° .—27th. Tongue dry and red; still very ill; P. 140; heat 102° .—28th. Tongue moistening; P. 130; heat 101° .—29th. Tongue cleaning at edges; P. 100; heat 100° .—30th. Heat falling, and improvement continues.

Peter Campbell, æt. 27. Admitted March 16th.—Much typhus rash; tongue furred. R brandy \mathfrak{z} vij. &c.—19th. Sleepless. R pil. morphiæ p. r. n.—20th and 21st. Sleeps better; P. 160, and small; heat 101° ; much rash. R camph. gr. v. 3tiis horis; brandy \mathfrak{z} xij.—22d. Low delirium; much oppression; heat 102° ; P. 130; respirations 36.—23d. P. 120; resps. 32; heat 99° .—24th. P. 88; resps. 22; heat 95° . Improved from this date.

These thermometrical indications are very valuable; and we generally found, as we were led to expect, that the fall in heat preceded the other signs of improvement. The thermometers were used at stated times daily, as by Dr. Davy, *Phys. Researches*, 1863, and by Drs. Anstie and Ringer.

T. CLIFFORD ALLBUTT, M.B.

VI. ON THE DIAGNOSIS, PATHOLOGY, AND TREATMENT OF PROGRESSIVE LOCOMOTOR ATAXY.

THE principal object of this paper is the publication of several important and original cases which have come under my own observation, and been watched and examined by myself with the greatest care. But as locomotor ataxy is a disease which is not extensively known or well understood, I shall probably adopt a more useful plan if I first give, by way of introduction, a concise but clear and methodical description of its various symptoms, drawn up chiefly from my own personal experience, but partly from that of others, and then illustrate this description by a history of the cases in question. It will be my endeavour to make the subject as practical as possible, and to assist the practitioner in forming a correct diagnosis in difficult cases, especially at the earlier stages of the disorder, when the symptoms are few and equivocal.

In this singular malady, at some period of its course, an invariable and essential symptom, as the term *ataxy* implies, consists of a peculiar unsteadiness in the performance of certain voluntary movements, arising from the loss, to a greater or less extent, of voluntary influence to control and combine or coördinate the action of the muscles necessary for the *steady* performance of those movements.

In almost every instance the unsteadiness begins, and continues to make the greatest progress, in the lower extremities. In a few cases (as in Case V., N.) it extends no further; but in general, and after a variable lapse of time, it reaches the upper extremities, the hands and forearms being the parts most affected; and there is one curious case on record, in which it was limited entirely to these parts, the

lower limbs retaining, through the whole course of the disease, their normal steadiness of motion.*

According to my own observations, the loss of power to control and coördinate the desired muscular actions presents itself under two forms. 1. It is manifested in the lower extremities as a simple unsteadiness of gait. The patient finds some difficulty in maintaining his equilibrium; he totters and staggers, to a greater or less extent, like a man somewhat intoxicated. He walks, sometimes with steps short and quick, sometimes with his legs more widely separated than usual, to obtain a surer basis of support; and when deprived of the help of a stick or of another person, he throws out his arms to assist in maintaining his balance. His greatest difficulty is on first starting; once in motion, he acquires, as he proceeds, a certain increase of control over his movements. If the disorder be not very far advanced, he can turn round and retrace his steps without stopping; but when he stands with his feet close together and his eyes closed, he reels and totters, and would unavoidably fall at once if he were not supported. At the same time he may be able to walk alone while looking straight before him, or sideways on surrounding objects, or even at the ceiling; but at a later period of the disease he cannot *stir* without keeping his eyes *fixed on his feet*.

When the upper extremities become affected, the loss of control over their movements is like that observed in the lower limbs, but is generally less extensive. Sometimes the patient's arms and hands and fingers are so unsteady—he has so lost the control over the particular muscular movements which he wills to perform, that he is no longer able, perhaps, to dress himself or button his clothes, to tie his cravat, pick up a pin, write, or turn an object round with his fingers. If he tries to touch his nose with his finger, his hand, very likely, is involuntarily carried to his cheek, to his ear, or to the side of his head.

2. The second kind of unsteadiness or disorderly movement is of a quick jerking character, and arises from spasmodic contraction of the muscles which are excited by the will, but which the will is no longer able to control. The

* Vernay, *Union Médicale*, 1862.

patient has lost, more or less, the power not only of *coördinating* the different muscles necessary for the intended movement, but of regulating *the degree of their contraction*. Once stimulated by the will, the muscles spasmodically contract beyond the degree intended, and flex or extend the limb with a sudden and uncontrollable jerk. All the intermediate states between flexion and extension are therefore the most difficult to be maintained. Hence, in walking, the patient, instead of bending his knee in the usual way, frequently contrives to keep his leg stiffly extended on his thigh, and to move the limb as a whole from the hip-joint, first forward and then backward, the heel coming to the ground with a kind of kick.

These two kinds of disorderly movement are associated together in different degrees in different individuals. In the early stages of the disease, according to my own observations, the first kind, which arises from loss of muscular coördination, is the one that generally prevails. At the same time there is frequently a variable loss of power in the lower extremities; and in some instances this failing is experienced before there is any remarkable unsteadiness of gait. The patient complains of a weakness and heaviness in one of his legs, or perhaps in both, which feel as if they were held to the ground by a weight. He suddenly finds, perhaps, that he cannot run or leap, ascend a hill, or get upstairs without assistance.

As the disease advances, the second or spasmodic kind of movement increases, but more rapidly and extensively in some cases than in others. When it is strongly marked, all the voluntary movements are more or less hurried and precipitate. The patient feels as if he were walking upon springs, or as if he were pushed forward from behind, so that he can no longer proceed without some support. If he attempt to take hold of an object on the table, he will probably thrust it from him by a spasmodic jerk of the arm, or his fingers will spasmodically extend and diverge, and then contract in a similar way. If he succeed in securing a glass of fluid, and endeavour to carry it to his mouth, he will spill the fluid with a jerk, and perhaps dash the vessel against his teeth. Emotion adds to his difficulty, and spontaneous twitchings of the muscles, especially of the fingers, occasionally perplex his endeavours. The disease is progressive: the loss of volun-

tary control and coördination of the muscles becomes more and more distressing. He can no longer walk or even stand without greater assistance: his trunk inclines gradually forward, and as soon as he attempts to step out, with his body bent and his eyes fixed on his feet, not only do the flexor and extensor muscles of his legs contract spasmodically, but the excitement spreads from these, as from a centre, to a number of others, which jerk the legs from side to side and from various intermediate points in the most disorderly manner conceivable. At length the wretched sufferer is wholly unable to advance, or even to stand without the powerful support of two persons; and in fact, when the case is extreme, it cannot be said that he is able to stand at all; for unless the whole weight of the trunk be supported, his knees and ankles give way, his feet become locked in each other, and he drops like a lifeless body. And yet—strange as it may seem—if he be seated on a chair, he can extend his legs upon his thighs with so much force that it is almost, or perhaps quite, impossible to bend them against his will. Now why is this? Because, as it appears to me, the erector muscles of the back, which stretch between the vertebral column and the pelvis, and maintain the erect position, have so lost their power of acting, that the pelvis and vertebral column being no longer fixed and held back, the extensor muscles which arise from them are no longer able to keep the legs in the rigid state of extension necessary for standing; so that the knees give way as the trunk falls forward, and the body comes down in a heap. But when the patient lies down on his back, or sits in a chair, the pelvis and vertebral column are supported, and therefore afford fixed points for the extensor muscles of the thighs and legs.

Now the ataxy, or disorder of motion, is always accompanied by a variable number of other nervous affections, which, however, are not peculiar to the disease. These affections consist of *pains*, *anæsthesia* and *analgesia* in different parts of the body; of *paralysis of one or more of the cerebral nerves*, especially those of the eyes; of derangement of the bladder, in the form chiefly of *incontinence of urine* and *dysuria*; of *spermatorrhœa* and *anaphrodisia*, or loss of sexual desire and sexual power.

All these affections are seldom present in the same individual, especially at the same period; but a variable number of them are differently grouped together in different cases and in different stages of the disease. Some of them, however, are more frequent and more permanent than others. The most constant and persistent are the pains and the anæsthesia.

The *pains* are remarkable chiefly for their sudden, intermittent, and shifting mode of attack. They may be considered to consist of two kinds. The one kind are more or less dull, aching, or gnawing, and resemble the pains of rheumatism, for which they are generally mistaken by the patient. The other kind are more acute, lancinating, and instantaneous in their attacks, like a succession of electric shocks. The sufferer describes them as darting, crushing, tearing, cutting, burning, or throbbing pains,—agonising in their intensity, as if the “funny bone” were violently struck, as if the nails were being torn out, or the foot were crushed by a weight; as if pieces of glass were embedded in the flesh, or the skin were scalded with boiling water; or like a succession of painful blows on some particular spot. The paroxysms come on quite suddenly, and after lasting from a few hours to a few days, as suddenly disappear, for a longer or shorter time. Mercifully, however, the pain during the paroxysm is not continuous, but intermittent, although it recurs sometimes in rapid succession—several times in a minute, for instance. During the whole of an attack the pain may be confined to a single, and perhaps a very small, part of the body, or it may fly from one part to another with the rapidity of lightning (Cases I. and IV.) In some instances it seldom attacks the same place during two successive paroxysms (Case V.); in others, no such regularity prevails. The parts which suffer most frequently and severely are the lower extremities, next the upper extremities, and then the head and face. The trunk is usually spared, except that a dull aching pain is sometimes experienced across the loins and back. In general the pains appear to be aggravated by constipation, and frequently by changes in the weather. The patient very commonly complains of another kind of feeling, which, although not painful in the ordinary sense of the term, is very distressing. This is a feeling of constriction around the waist and chest, as if a tight band of variable

breadth, or a tight waistcoat, were compressing the parts. There is also not unfrequently experienced a tightness, weight, and bearing-down in the abdomen, as if its contents would be forced out; and at other times severe griping pains attack the same part.

Cutaneous *anæsthesia*, to a variable degree and extent, almost always accompanies the ataxy. The patient complains of numbness in different parts of the body, but chiefly in the legs and arms. It is generally most severe and extensive in the lower extremities, beginning in one or more of the toes, and creeping gradually up the leg, sometimes even to the thigh. In the parts first attacked the numbness is greatest. The individual experiences an unnatural and almost indescribable sensation in his feet. Although, perhaps, he can feel that he is walking on a hard surface, he complains that he "has no hold on the ground." Commonly, however, he feels as if he were walking on something soft like wool, and then he cannot trust his steps; he cannot, unless he looks, be convinced that his foot has reached the ground, which, judging from the unnatural sensation it excites, appears to him insufficient for the support of his weight. His shoes feel as if they were slipping off his feet, or as if they were being dragged off by something in which he was walking, and in which they became entangled (Case VII.). In severer cases he can scarcely feel that he has any feet at all; and then, as I have sometimes heard him say, he seems to be "walking on air" or "on his ankle-joints" (Case IV.); and when the numbness extends up the thighs, he may seem to be "walking on his hip-joints" (Case VII.).

In the upper extremities the numbness is generally more limited in extent and slower in its progress. It commonly begins in the little and ring-fingers of one hand, extending perhaps, after a time, to the other hand; then upwards to the wrists, and sometimes as far as the elbows, but seldom higher. Now and then, as in Case VII., it is confined almost entirely to the fingers that were first attacked; and in other instances, as in Cases II. and VI., it is limited to the *ends* of the fingers.

The extremities, however, although most frequently attacked, are not the only portions of the body subject to

cutaneous anæsthesia. It is not uncommon to find it, in a greater or less degree, affecting particular parts of the head and face, as around the mouth, in the chin, and the forehead (Case II.); and in rare instances, one of which has come under my own observation, there is numbness, and at times complete anæsthesia, of the whole of one side of the face, tongue, and gums.

How much this numbness, or loss of tactile sensibility, increases the difficulty of locomotion and prehension, is doubtless manifest to all. It is the reason why the patient is constantly compelled to look at his feet when he walks, to see that they are really resting on the ground; or to look at his hands, to ascertain whether he holds an object in his fingers; for although he may experience distinctly the *pressure* of his thumb against his fingers, he does not know whether there is any object between them, as he has lost the power of distinguishing, by tactile sensibility, the difference between one kind of substance and another, and is very likely to mistake one of his own fingers for the object sought. (See Case I.)

In addition to the loss of *tactile* sensibility, there is often, in the same person, a loss of sensibility to *pain*, or analgesia, to a variable extent and degree. Pinching up the flesh between the nails, pulling out hairs, or even pricking deeply with a needle, may excite, perhaps, only a slight sensation of pain, or even no pain at all, but only a sensation of *pressure*, at least at the moment when the experiment is made; for in some instances, after a certain lapse of time, varying from a few seconds to a few minutes, the patient begins to complain of pain in the injured part. This circumstance depends on the extreme slowness with which the impression is conveyed by the nerves to the sensorium. In Case VII. three or four minutes elapsed before the patient experienced any sensation of pain in the part that had been pricked; and in Case IV. it was not till after the remarkably long interval of *twenty minutes* that the patient, without being asked, complained of smarting in the part whence blood had been drawn by a needle. In some few cases, instead of anæsthesia, there appears to be cutaneous and muscular hyperæsthesia to a very extraordinary degree. The slightest touch causes ex-

cruciating pain. I may here also mention a rare instance of exalted reflex-excitability of the spinal cord which recently came under my observation, and which might very easily be mistaken for hyperæsthesia, or increased sensibility to pain. (See Case VII.) Although, as will be seen, the feet and legs were almost completely deprived of the sense of touch and pain, yet their surfaces were so susceptible to excito-motor impressions, that the slightest brush or touch threw the whole body into motion, and caused the patient to jump almost from his chair.

In severe and protracted cases the deeper tissues surrounding the bones and joints are deprived more or less of their sensibility, so that passive movements of the limbs are imperfectly felt. The muscles, also, are frequently insensible, not only to pricking and pinching, but to the electro-magnetic stimulus; and it is generally believed that the muscular sense, or the sense of muscular contraction, as a guiding sensation, is sometimes lost or impaired; but as this sense has, in my opinion, very little to do with the motor difficulties of ataxy, and as the indications even of its existence are exceedingly obscure, I need not dwell upon the subject.

One other kind of sensibility, however, is often affected in ataxy—I mean the sensibility to temperature. In some cases it is only more or less impaired; in others it is wholly abolished. Generally it outlives the sense of touch and pain; and of all the senses, indeed, it is the last to disappear.*

* The opinion that the sensation of heat and of touch depends on different sets of nerves was first put forward by Dr. Erasmus Darwin. After stating his own arguments, he quotes the following passage from a letter of Dr. R. W. Darwin, when he was a student at Edinburgh:—"I made an experiment yesterday at our hospital which much favours your opinion that the sensation of heat and of touch depends on different sets of nerves. A man who had lately recovered from a fever, and was still weak, was seized with violent cramps in his legs and feet; which were removed by opiates, except that one of his feet remained insensible. Mr. Ewart pricked him with a pin in five or six places, and the patient declared he did not feel it in the least, nor was he sensible of a very smart pinch. I then held a red-hot poker at some distance, and brought it gradually nearer, till it came within three inches, when he asserted that he felt it quite distinctly. I suppose some violent irritation on the nerves of touch had caused the cramps, and had left them paralytic; while the nerves of heat, having suffered no increased stimulus, retained their irritability." *Zoonomia*, by Erasmus Darwin, M.D., F.R.S., third ed. 1801, vol. i. pp. 166, 167.

Let us now proceed to the affections of the cerebral nerves. Sometimes these affections never make their appearance; sometimes they occur only at particular periods of the disease, and sometimes they continue throughout. Those of the eye are by far the most common: and of those, paralysis of the third and sixth nerves, amblyopia and amaurosis, are the principal. In more than half the cases of ataxy, paralysis of either the third or the sixth nerve, with diplopia, occurs during the *first stage* of the disease. Occasionally this is for a long time the only symptom that excites attention. It may come on in a moment, without the slightest warning, and in a state of apparent health. A person rises as usual in the morning, and perhaps discovers to his surprise that he sees double and squints. The great peculiarity, however, of this affection in ataxy is the intermittence of its attacks. It may continue for a few days, a few weeks, or a few months, and then disappear as suddenly as it came,—but only, perhaps, to return, after an absence of variable length; or it may persist steadily and uninterruptedly from the beginning to the end of the disease. Sometimes it occurs only at certain times in the day, under certain conditions, as during emotion, or when the eyes have been much fatigued. In some cases the paralysis of the nerve is double, but much more frequently it is limited to one eye. In other cases where there is no apparent paralysis of the nerves, as there is no apparent strabismus, there is nevertheless diplopia or double vision, when the patient looks in a particular direction (Case I.). On such occasions there is doubtless some slight deviation from parallelism in the axes of the two eyes, although this deviation is not appreciable by the observer. A more curious condition is *monocular* diplopia, where two images are seen by one eye, while the other is closed. This likewise may occur when there is no perceptible strabismus. Such a case is recorded by Oulmont. A still more remarkable fact, and one less easily explained, is the perception of *three* images when both eyes are open. This anomaly, however, is not peculiar to ataxy; it occurs in other disorders of the nervous system, particularly in hysteria.

The strabismus arising from paralysis of the third nerve is often accompanied by more or less ptosis and dilatation of

the pupil. In some patients one pupil is dilated, while the other is contracted; in others both pupils are reduced to a very small size, even when there is no other apparent affection of the third nerve or of any of the ocular nerves (Cases V. and VII.). In one patient who came under my observation there had been great dilatation of the right pupil for seventeen years, with partial loss of *visual accommodation*, but no other affection of the eyes.

Amblyopia is one of the earliest and most common of the ocular disturbances in ataxy. It seldom disappears, or even remains stationary, but generally increases at a variable rate, and terminates frequently in amaurosis. The amaurosis may be confined to one eye; but often, sooner or later, it affects that of the opposite side.

Affections of the first, fifth, seventh, eighth, and ninth cerebral nerves are comparatively rare, especially those of the olfactory, auditory, and gustatory nerves. Case VII., however, affords a striking instance of the almost total abolition of both taste and smell in the same individual. The patient is quite unable to distinguish the flavour of different substances, although common sensation—which depends on the sensory division of the fifth nerve—is still retained in the tongue. On the other hand, his sense of smell is so much impaired that he cannot distinguish one kind of odour from another, and indeed can smell nothing that is not exceedingly offensive. In the same patient common sensation is impaired over the right side of the nose, which is supplied by branches of the fifth nerve; and voluntary motion of the same part, dependent on branches of the facial nerve, is in a certain manner lost. I have seen one case in which, at a particular period of the disease, there was total loss of sensation on the left side of the face, head, and tongue. Trousseau records a similar case; and Duchenne mentions one in which there was paralysis of both fifth nerves, with paralysis of the velum palati and larynx (involving the eighth nerves). Affections of the ninth or hypoglossal nerves are manifested chiefly by difficulty of articulation, but are very rare in ataxy.

The disorders of the urinary organs, like the paralysis of the motor nerves of the eye, are remarkable for the intermittence of their attacks, which come on and disappear, or in-

crease and abate at very irregular intervals. They consist of dysuria and incontinence of urine, which frequently occur alternately at the same period of the disease. The dysuria arises either from temporary paralysis of the bladder, or from loss of power to strain in attempting to pass water; or perhaps from these two affections together (Case II.). When the urine is retained for a certain time, the changes which it undergoes produce considerable irritation in the mucous coat of the bladder.

The organs of generation rarely escape mischief in a greater or less degree. Spermatorrhœa, followed by impotence and loss of sexual desire, almost always ensues in the course of the disease. A few cases, however, are recorded in which the sexual desire and power were morbidly increased.

Such are the principal symptoms that mark the progress of locomotor ataxy. As already observed, they are never all present in the same individual, even at different stages of the disease, but occur in groups of variable size, in which some are more frequent and persistent than others. As regards the order of their appearance also, some of them differ considerably amongst themselves in different groups; but there are two which almost invariably precede the rest. These are the *pains* and the *ocular disturbances*.

The pains are most frequently the first trouble that comes upon the patient, and they are scarcely ever absent except at intervals. Sometimes they exist alone, or in company with some local anæsthesia for months, or even years, before there is any other warning of motor incoördination. In rare instances they do not make their appearance till very late in the disease, as in Case II. But cases sometimes occur in which the whole group of symptoms suddenly appear at nearly the same time, or in rapid succession.

In a great number of instances, however, the ocular disturbances, as already stated, for a long time precede the pains, and, like them, are frequently the only symptoms of which the patient complains.

These affections, in the form of strabismus, amblyopia, or amaurosis, and the shooting, shifting, and intermittent pains, are considered by Duchenne to constitute a first stage of ataxy, which may last from a few months to several years. A second

stage is marked by the unsteadiness of gait, or loss of muscular coördination, either accompanied or soon after followed by anæsthesia and analgesia, chiefly in the lower extremities. In the third stage many of the symptoms increase in severity, and become more general; the loss of voluntary coördination extending to the upper extremities. This division into three stages, however, must be received as applicable only to the majority of cases, and not to all.

I will now bring forward a series of interesting and original cases, presenting as many different groups of the symptoms and affections that I have just been describing.

CASE I.—R., æt. 35, formerly a bricklayer. Twelve years back, while in his usual state of health, he found one day that he had internal strabismus of the left eye, attended with slight pain at the back of the head, and diplopia. In walking along the side of a wall or hedge, he would see another wall or hedge cutting it at an acute angle. He frequently grasped at an imaginary object instead of the true one. For this affection he went into Guy's Hospital, under the care of Mr. France, and was cured.

About four years later, after working for some time in a damp place, and getting repeatedly wet, he was attacked by "rheumatic" pains in the knees, with numbness of the toes of both feet and of the tips of the fingers of both hands. Soon after he complained of difficulty in walking, and fatigue; his gait was jerking and irregular, as if he was walking on springs. About the same period, he had some return of the strabismus and diplopia.

Present state. He has now no apparent strabismus, but still he sees double when he turns his eyes in a particular way to the left, as in standing at the door and looking in that direction up the street. His sight is tolerably good; but he has a dull, rather stupid expression of the eyes, and both pupils are contracted to about the size of pins' heads.

The pains which he now experiences are different in kind from those of which he first complained; they are more acute, sudden, and darting. They come on like an electric shock, or resemble the sensation of striking the "funny bone." He now feels them in his arms, but not so severely as in his legs. Sometimes they attack the same parts in successive paroxysms, and sometimes not. They often fly from under the great-toe nails of the left foot to the cap of the opposite knee. Sometimes the pain is confined to the great toe, recurring at intervals of every half-minute, every minute, or every few minutes, and continuing in this way throughout the night, and perhaps the next day, leaving behind it a stiffness and soreness of the leg. After this he may pass one, two, or even several weeks without any suffering whatever. The pains appear to attack more particularly those

parts which have been most exercised or most fatigued. They are always aggravated by constipation.

He feels tired after walking a little distance, and is obliged to rest. He can walk without support when his eyes are open, and even when they are nearly closed, if he can discern only a glimmer of surrounding objects; but as soon as he closes them entirely, he totters, and falls.

His tactile sensibility is very much impaired. It is better when he is sitting down, because, he says, his attention is not withdrawn by attempting to maintain his equilibrium. He cannot get a piece of money out of his pocket without the assistance of sight, for he does not know by the sense of touch whether it is between his fingers or not, although he can feel the *pressure* of his fingers against his thumb. His sensibility of temperature and pain, however, are normal, and he has a perfect sense of feeling in all the joints while bending them.

He can manage to write now, although formerly he could not do so at all. He writes best on his knee with his arm close to his side. He cannot continue to hold his pen in the ordinary way, but holds it between the ball of his thumb and the first joint of his forefinger. He has some incontinence of urine, and frequently complains of a dull forcing or bearing-down pain at the sides of the abdomen, as if it would cause an evacuation of both the urine and fæces.

This case affords a very good example of a common form of locomotor ataxy. It presents a group of symptoms which made their appearance in the order in which they are mentioned, viz. strabismus; pains in the legs, with numbness of the toes; unsteadiness of gait; numbness of fingers, followed by pains in the arms, with unsteadiness of movement, or loss of coördinating power; incontinence of urine.

CASE II.—J. E., æt. 35; married, and has had ten children, of which four are living. His illness began about four years ago, with great nervousness and external strabismus of the right eye. He became subject to great depression of spirits, felt miserable, and shunned society. The nervousness lasted about one year, but the strabismus has persisted uninterruptedly to the present time. Soon after the appearance of the strabismus he began to complain of weakness in both his legs, particularly the right, and in his right arm. His right leg frequently bent under him in walking, and he found that he was unable to run, because his legs felt heavy. This weakness was shortly followed by numbness in the dorsum of each foot, particularly the right, and numbness of the right hand as high as the wrist. In the left hand the only parts affected with numbness were the joints of the little and ring-fingers. The arm on that side is as strong as ever. He never experienced any pains until about a year ago, when they attacked both the upper and lower extremities.

Present state. With the exception of the depression of spirits, he remains in the condition above described. The pains in the lower extremities consist of a repetition of violent shocks from the hips to the ankles. In the upper extremities they are "rheumatic," and extend only from the shoulders to the elbows. They are felt chiefly at change of weather. He cannot walk or even stand without the support of a stick, and walks with his legs somewhat stiff and straightened, bringing down the foot to the ground with a kind of backward kick.

In looking straight forward, the axes of both eyes appear to be nearly parallel; but when he looks to the right, without moving his head, the right eye remains immovable from paralysis of the sixth nerve. His sight is somewhat impaired, but he can read small print without glasses. For some months he has felt shooting pains at the top of his head and in the forehead. He has also a slight sensation of numbness around the mouth, and his lips feel swollen and stiff. His sense of smell is somewhat impaired, and he has occasional loss of taste. For the last two years he had rachialgia and a feeling of constriction round the abdomen. He has partly lost the power of straining, and control over the sphincter of the bladder. Sometimes he has difficulty in passing his water, which dribbles away instead of flowing in a stream; sometimes he has difficulty in retaining it when the necessity of passing it is urgent; and if he suddenly coughs, it will escape involuntarily. But under other circumstances there has been no incontinence, except on one or two occasions. His bowels are generally constipated, and he has some loss of control over the sphincter ani; for if he takes aperient medicine, he has no power of retaining the evacuations. Through the whole of his illness he has occasionally had griping pains in the bowels. For the last two years both sexual power and desire have been gradually failing. Sometimes he has the desire without the power of gratifying it. There is some sugar in his urine, but no albumen.

In this case the group of symptoms, in the order of their appearance, consists of strabismus and diplopia; weakness and heaviness of legs and right arm; numbness in feet, hands, and around the mouth; pains in upper and lower extremities and in head; incontinence of urine and dysuria; some impairment of smell and taste; rachialgia, and griping of bowels; loss of sexual power and desire.

In Case I. the strabismus came on alone, and after a time disappeared; but returned at the end of four years with other symptoms, and again disappeared. In Case II. the strabismus persisted from the beginning, without variation. It is worthy of remark also, that the pains, which usually belong to the first or early stage, were not experienced till late in the disease.

CASE III.—B. L., æt. 43. Widower, and father of three children ; pallid, emaciated, and apparently ill-fed. Six years ago he began to feel gnawing “rheumatic” and flying pains in his legs and arms, without any numbness. It is only since the last twelve or fourteen months that he has begun to feel any numbness, first in the feet and then in the tips of the fingers, and gradually extending to the wrist and elbow of each arm. Weakness of the legs and difficulty of walking came on soon after the pains. Has never had strabismus nor diplopia ; but the sight of the right eye is confused, as if objects near each other first moved about and then blended together. This, however, occurs only occasionally—perhaps for two or three weeks together ; but while it lasts he is quite unable to read. If at these times he looks at very large print, the letters appear to be surrounded by a fringe. At other times he can read small print without glasses. For some months past he has felt slight numbness across the lips, tongue, and gums, with some loss of taste. The sense of smell is natural. Has never had incontinence of urine, but has some dysuria. Has a feeling of constriction round the waist. Formerly he had pain across the middle and lower parts of the back. No apparent loss of sexual power or desire.

CASE IV.—R. A., æt. 45. Married, the father of seven children. Has drunk a great deal of beer, although not a drunkard. His father suffered much from rheumatism. Eight years back R. A. began to feel pains, with heaviness, and numbness in his legs, as if a weight were attached to them. The pains were sharp and darting, both when at rest and in exercise. They did not attack the arms till three years after the legs ; but they are of the same kind, and sometimes run along the fingers, taking the use of them away for a time. Had pains in the stomach and chest, but they are gone ; and had at one time a sensation of tightness round the waist. Has never had strabismus or amblyopia ; but on one single occasion he saw double.

Present state. Slight atrophy of retina. Pupils of moderate and equal size. His hearing is rather dull. Taste and smell natural. Complains of feeling weak, particularly after exertion. Walks like a drunken man, without any jerking or spasmodic movement of the limbs. Cannot walk without looking at his feet. Cannot stand on one foot, nor with both feet close together when his eyes are shut. He can kick out with either leg pretty strongly, but not with so much force as formerly. He can strike out both arms with considerable force, but not so strongly as formerly ; and exertion of this kind weakens them rapidly. The muscles are not at all wasted ; but he cannot grasp firmly. When he sits down and extends either leg, it is impossible to flex the knee against his will.

Both his feet are numb, and he feels “as if he was walking on his ankle-joints.” Both hands are numb, but particularly the right, and the numbness sometimes extends to the forearm. He can pick up a pin, button his clothes, and shave himself, but with some difficulty. The pains in his legs shift rapidly from place to place, and throw him

into a perspiration, which seems to relieve them. They are very severe in the toes, especially in the great toes, and feel as if the nails were being torn off. The nails *have* come off both great toes. The attacks of pain frequently begin by a kind of "fluttering sensation" at a particular part of the leg, and from this spot extend all over the limb. There is incontinence of urine, alternating with dysuria. Sometimes the urine comes away when he coughs or sneezes. When he strains to pass his water he feels increased numbness of the right hand, extending occasionally up the arm and the side of the face.

He can feel differences of temperature in the legs, but in the feet there is almost complete analgesia, or loss of sensibility to pain. When I pricked him deeply with a needle he felt no pain at the time; but about twenty minutes after, he of his own accord complained of a sensation of smarting in the part. Has occasionally had hæmorrhoids, attended by a great deal of pain extending down the legs whenever the hæmorrhoids were touched, or when he sat on a hard seat. For the last twelve months sexual power has been almost entirely lost. His general health is good.

In this case the group of symptoms consists of pains, with numbness and heaviness, in the legs; pains in abdomen and chest; pains and numbness in hands and arms; analgesia; incontinence of urine and dysuria; hæmorrhoids; loss of sexual power.

CASE V.—N., æt. 50. Married; has had six children. Has never had any ocular affections. His sight is tolerably good; can read and write without glasses. Both pupils, however, are very small; but constantly and rapidly vary somewhat in size under the same degree of light. His illness began about ten years back, with pains in the lower extremities, and unsteadiness of gait. The pains are severe and darting, and never extend above the hip; but he has a duller pain across the back, which is relieved on lying down. Sometimes the outside of the little toe is alone attacked by severe pain for two or three hours together. The same spot, however, is seldom fixed upon during two successive paroxysms. Sometimes the knee-cap alone, and sometimes the knee-joint is attacked.

When the unsteadiness of gait began, he walked like a drunken man, and was often accused of being intoxicated. His gait now is more spasmodic and jerking. After standing a few minutes, his knees give way, and in this state he could not walk across the road, unless he first sat down and rested. When he shuts his eyes while standing, he not only feels that he is falling, but experiences a sensation of giddiness. The upper extremities have never been affected either by pains or unsteadiness of movement. He can write perfectly well in the ordinary way, and writes a great deal, for he holds a situation as clerk.

He has incontinence of urine to a considerable extent. Bowels

rather constipated. Thinks he had occasional nocturnal emissions before marriage; has had them throughout his married life, except the two last years. Sexual capacity has been diminishing for the last five or six years.

This is an uncommon case of locomotor ataxy. The symptoms are few, consisting only of pains, incontinence of urine, rachialgia, and anaphrodisia. They do not conform to the division of the disease into three stages, neither the first nor the third stage being marked by its usual characters. The unsteadiness of gait was not preceded by any ocular disturbance, or even, as is still more common, by the pains, which seem to have made their appearance about the same time as the loss of muscular coördination. Nor did these symptoms become generalised, as they do in the third stage, but were limited entirely to the lower extremities.

CASE VI.—E. C., æt. 58. A dyer; married; has had four children. Of sober habits. Never had strabismus; his sight is as good as that of most persons of his age. Has for years had "rheumatic" pains flying about the arms, shoulders, and head, for which he took gin and brimstone with much benefit. In his business he was in the habit of wearing wooden shoes, because the ground where he worked was always exceedingly wet. About twelve months back, his wooden shoes having become damaged, he wore leather shoes for a fortnight, and during that period his feet were continually wet and cold. Immediately after, he began to feel numbness in both great toes. The numbness gradually extended to the other toes, then to the legs, thighs, hips, penis, and scrotum; and, at length, in all these parts sensation was entirely lost. Meanwhile a numbness affected the ends of the fingers of both hands, but mostly of the left. About three months later, sensation partly returned to the legs and feet, but great numbness remained, and he began to experience the pains that have continued ever since.

Present state. No ocular disturbance. Pupils of moderate size. Cutaneous sensibility of legs and feet dull; but feels pricking and pinching. His pains always begin in the great toes, and shoot up the legs to the hips. They come on only when he is warm. The other toes are also painful when he is warm, but the shooting pains along the legs proceed only from the great toes. Pressure also made on the nerves by crossing the legs will bring on the pains in the toes. They recur almost every night in bed, and last generally from one hour to three hours. He describes them as resembling the pain produced by striking the "funny bone." His legs and ankles always feel stiff. He walks like a drunken man, and in stepping he has a slight tendency to kick the leg forward with a jerk, and then the feet come down to the ground, on the heels first, and then heavily and flatly on the soles. He

complains of great weakness in the legs, as if they would give way in walking or standing: but when he sat down, and extended either leg, I was scarcely able to flex the knee against his will. He can stamp pretty firmly with his feet, and feels the ground as a solid substance, and not as wool or any thing soft, but does not feel it so distinctly as formerly—his feet do not feel as if they “laid hold of the ground.” He can stand or walk while looking up at the ceiling, but falls immediately when he shuts his eyes. He has some incontinence of urine; the water dribbles away occasionally. His general health is tolerably good.

This is a very singular, and, in some respects, a very instructive and important case. The only symptoms accompanying the disorder of movement are the pains, the numbness, and some incontinence of urine. The pains are similar in kind to those which are felt in most cases of ataxy, but they have this peculiarity, that instead of flying from one side of the leg to another, and originating at different spots, they always begin in the great toes, and shoot up the legs to the hips; and never make their attack except when the patient is warm. Moreover, the etiology of the disease in this case appears to be clearly indicated; for the numbness of the feet came on immediately after their exposure to cold and wet, and was shortly followed by the other symptoms.

CASE VII.—R. W., æt. 51. Married; has had ten children, seven of whom are living. His father died at 72, and his mother at 70.

Twenty years ago he had “brain-fever,” brought on by anxiety and drink. Thirteen years ago he had severe rheumatic fever for twelve weeks. From ten to thirty years of age he was subject to epileptic fits, brought on by fright at the bite of a dog. For many years he had hæmorrhoids, which bled a great deal at times, and became very large outside. A year ago he had them removed. Two months before their removal he began to experience pains round the lower part of the back and along the perinæum, with heavy forcing pains in the rectum and tightness and weight in the abdomen. The attacks of pain always began in the middle of the penis, and extended along the perinæum to the middle of the sacrum. All these parts became numb. He no longer felt the passage of his urine along the urethra. The removal of the piles rather aggravated than relieved the pains. For two or three years before the operation there was great discharge of offensive fluid from the rectum, and the fæces came away with it on slight exertion, such as stooping, stepping up stairs, or lifting a weight. At the water-closet his evacuations seemed to drop from him without straining, “as if the passage was much too large.” Soon after the operation he began to complain of pains in the legs. At first an acute pain was confined to a small spot not bigger than a marble, on the

inside and corresponding part of each thigh. It usually lasted from two or three to twenty-four hours. Has scarcely ever had pain in any other part of the thighs; but shortly after, he had pain from the knee downward, affecting chiefly the fleshy parts, the nails, and the shin-bones.

Present state. No strabismus, and he says he has never had any. His sight is not bad for his age, and is improved by the use of glasses. Both pupils are contracted to about the size of a pin's head. His taste is so much impaired that he is quite unable to distinguish the flavours of different substances. Salt, for instance, does not taste to him like salt, but causes a burning sensation on the tongue; and so with onions, &c.; but common sensation and motion of the tongue and cheek are normal. There is slight deafness; but this is probably from a temporary cold. The sense of smell is much and permanently impaired. He cannot distinguish one scent from another, and can smell nothing that is not exceedingly offensive. His nostrils are very much blocked up. On the right side of the nose and nostril common sensation and motion are decidedly impaired. He cannot sniff up with that nostril, as in taking a pinch of snuff, unless he closes the opposite one, and then only imperfectly; yet he can draw up the *alæ nasi* together equally. In all other parts of the face sensation and motion are unaffected.

He has all through his illness had a dull pain across his forehead, with a kind of mental incapacity, as if from want of sleep; and he says that for three or four months he experienced an acute pain over the left eyebrow, "as if a nail was driven in." Sometimes he is very much depressed in spirits; at other times he is quite cheerful. He complains much of the tight, forcing sensation in the abdomen, as if he wanted to evacuate the bowels. The numbness extends from the perinæum, chiefly along the inner sides of both thighs, and thence down the legs to the feet, particularly the soles. When he walks he scarcely feels his feet, but experiences a jolting sensation at the hip-joints, "as if he was walking on his hips." When sitting on a hard smooth seat he feels as if he was sitting on hard lumps or a very uneven surface. When requested to lie down on his side, with his legs stretched along another chair, he says that he does not feel the sensation of lumps, nor his legs at all, and is quite easy; but as soon as I desired him to sit up, and he put his feet to the ground, the numbness and heaviness were experienced in the feet—a numbness resembling that of a part that has been "asleep," but in a less degree. At most parts of the feet and legs there was analgesia, or loss of the sense of pain. When I pricked them with a needle deep enough to draw blood he felt no pain at the time, but only a sensation of pressure. Three or four minutes after, however, he began, of his own accord, to complain of a smarting sensation in the parts. But there were some spots on the dorsum of each foot and on each leg, in which he experienced pain at the moment they were pricked. Notwithstanding this loss of sensibility to mechanical irritation, the legs are the seat of severe pains, which come on spontaneously, and are scarcely ever ab-

sent; for even when the acute darting shocks have subsided he almost constantly suffers from a sensation of gnawing, burning, or scalding, or like a painful scratching. He is always easier when he stands or moves about. Both his great-toe nails have fallen off.

Of the right hand the three last fingers are numb, but no other part. He can use the thumb and forefinger of that hand perfectly, and pick up any small object; but he then complains of an unpleasant kind of "shuddering or quivering" sensation all along the arm and shoulder, over the blade-bone and across the back, between the angles of the scapulæ. Occasionally there is severe itching across this part of the back. The whole of the left hand is completely numb as high as the wrist. The nails feel as if they were crammed tight with dirt. The patient speaks of a fine quivering or tremor of the flesh along the palmar sides of the fingers, "like the quivering of jelly;" and on examination a very fine tremulous movement may be observed. He can grasp well with both hands, but not so well as formerly.

The reflex susceptibility of the legs is exalted to an extraordinary degree. The slightest contact with any thing—the skirts of his own coat, any one's dress, or a slight touch with the finger—excites an uncontrollable and convulsive movement of the body and all the limbs, so that he almost starts from his chair.

His gait is tottering and unsteady, like that of a drunken man; but there is scarcely any appearance of jerking or spasm in his voluntary movements. He cannot stand with his feet close together, even when his eyes are open. When walking along he feels heaviness in his legs,—a difficulty in advancing them, as if he was walking up-hill or against a strong wind, or rather as if he was walking through water up to his hips. His feelings and power of motion, however, vary considerably many times a day. Sometimes he feels brisk, and can get on pretty well in walking; at other times he feels "as if he should fall to pieces." When he sits down with his heels resting on the ground he can extend his feet at the ankle-joints, but flexes them with difficulty, and slowly; when the feet are extended in the air without support he is quite unable to flex them. In both instances, but particularly in the latter, he feels as if his effort was resisted by some force exerted across the ball of the foot, or the articulation of the phalanges with the metatarsal bones. All the different movements of the feet at the ankle-joints are somewhat difficult and imperfect. He cannot move the toes separately, but can flex and extend them all together. On account of the numbness of his feet, he feels in walking as if his boots were slipping off, as if he was walking through something,—through mud or straw that was dragging them off. His general health is pretty good.

This is unquestionably one of the most interesting and important cases on record, exhibiting, as it does, amongst other peculiarities, certain affections that are rarely found

in ataxy—viz. the remarkable reflex excitability of the skin of the feet and legs, the loss of taste, and the loss of smell. The first of these I do not recollect to have seen any where recorded. It was not due to cutaneous hyperæsthesia; for we have seen that the sense of both touch and pain was almost entirely abolished. The loss of taste is a rare affection, not more than two or three instances of it being on record. The loss of smell is still rarer. Duchenne in 1861 had not met with a single case, although this is the second that has come under my observation. In the other there was also, at one period of the disease, anæsthesia of one side of the face and tongue.

Diagnosis.—In no malady is a very early diagnosis more important than in locomotor ataxy. In its advanced stages, when two or three of the ordinary symptoms are accompanied by unsteadiness of gait, it is easy enough, in general, to determine the nature of the disease; but at an earlier period, before the loss of muscular coördination has made its appearance, or become sufficiently marked, and when only one or perhaps two of the other symptoms are present, the diagnosis is exceedingly difficult, and in some cases impossible. Strabismus, amaurosis, anæsthesia, and the so-called “rheumatic” pains, which frequently precede, for a great length of time, the unsteadiness of voluntary movement, are experienced in other disorders which differ essentially from locomotor ataxy. But nevertheless, whenever any one of these affections supervenes, it should always suggest the possibility of it being a precursor of ataxy. Moreover, there is often in these symptoms a certain peculiarity, which may assist us in forming a correct diagnosis. Thus, in a large proportion of instances the strabismus is accompanied by amblyopia; and when it is single the amblyopia is on the corresponding side.* Again, the peculiar nature and manner of many of the pains—their sudden attacks and equally sudden disappearance, their rapid shifting from one place to another, or their singular proneness to fix, sometimes, for hours, on one particular spot—are not

* Dr. Hughlings states that the amaurosis of ataxy, as regards its ophthalmoscopical appearance, is unlike the amaurosis from disease of parts within the head. In amaurosis from intracranial disease the optic disc always shows evidences of recent or past neuritis, which is not the case in ataxy. *Lancet*, June 10, 1865.

without their significance. The evidence becomes, of course, more important in proportion as they are accompanied by one or more of the other symptoms which belong to the first stage; and when to these is added, at a later period, the characteristic unsteadiness of gait, the nature of the disease is unmistakable. Unsteadiness of gait, however, closely resembling that of locomotor ataxy, is not unfrequently experienced in other affections of the nervous centres; and when the symptoms which usually precede or attend the muscular disorder have never made their appearance, or are doubtful or otherwise explainable, the diagnosis is often perplexing. In such cases Trousseau has proposed a method of distinguishing the muscular incoördination of locomotor ataxy from that which results from some kinds of cerebral disease. If the patients, he says, be placed upright with their feet close together, and then shut their eyes, the ataxic patient will stagger and fall; but the one who has disease of the cerebellum will perfectly maintain his equilibrium. This peculiarity, however, is not always observable, and therefore cannot always be relied on as a point in differential diagnosis, as the following interesting case of cerebral disease, which I have now under treatment, will prove:

CASE VIII.—J. C., æt. 42, father of seven children; a sensible and well-informed man. His father died of disease of the heart, æt. 55. His illness began seventeen years back, with a feeling of "pins and needles" in the calves of both legs and the backs of his thighs, with an aching pain in the knee-joints and a difficulty in walking straight. For several years he was librarian to a literary institution; but from the unsteadiness of his walk he was frequently accused of intoxication, and was at length requested to resign his situation. The "pins and needles" lasted for some months.

Present state. There is a want of expression in his countenance, particularly in his eyes, which somewhat resemble those of a man slightly intoxicated. They seldom seem to be fixed on particular spots, but have something of the unmeaning gaze which is common in general paralysis, and peculiar to young infants. But his sight is good: he can read small print without glasses, and has never had amblyopia or strabismus. The pupils of his eyes are rather large. The two sides of the mouth are not quite symmetrical, the right angle being slightly drawn up. The tongue, when protruded, points slightly to the same side, but is not at all tremulous. His hearing on the right side has been getting duller for the last four years. He has some thickness and difficulty of articulation, which is better or worse at different periods, but has been

slowly increasing for some years. Occasionally, and particularly in dull weather, he complains of confusion of mind, and says that his memory is not so good as formerly. He is seldom troubled with any pain in the head, but always feels more or less giddy, although never in a great degree. If (as it has more than once happened) he suddenly looked up to a first-floor window on being called to in the street, he became perfectly giddy, and was obliged to hold on to something to prevent himself from falling; then he felt "as if the blood ran from the front to the back of his head," and he could not stir until he had bent his head downward.

His gait is unsteady: he staggers and totters precisely like a man that is somewhat intoxicated, and walks with his legs wide apart to assist in maintaining his balance. His greatest difficulty is on starting, but he can turn round without stopping. He can walk while looking at the ceiling or the sky, but not so well as when he looks on the ground or straight before him. When he casts his eyes across the road to the right or left, he becomes much less steady. With his eyes *open* he can stand quite steadily when his feet are somewhat apart, but not when he brings them together. With his eyes *shut* he can stand when his legs are apart, but not quite steadily; he then complains of a feeling of swimming or giddiness in his head; *and when his feet are brought together he becomes gradually more unsteady, and would fall unless supported.* Sometimes he complains of feeling weak in the legs; but he frequently walks long distances—several miles—without fatigue, and is always stronger and better in bright weather. If he sits down and extends his leg, I am unable to bend it against his will. He has long ceased to feel "pins and needles" in his legs, nor has he any other pains; but after sitting down for some time he experiences a stiffness on rising. There is no anæsthesia or numbness. His upper extremities are quite unaffected as regards both sensation and motion. He can write and perform every other kind of motion perfectly.

He has never had either incontinence of urine or dysuria, either any increase or diminution of sexual appetite and power. His bowels are habitually constipated, but his appetite, digestion, and general health are good: in short, with the exception of the unsteadiness of gait, and some slight weakness in his legs, he feels, he says, as well as ever he was in his life.

It is evident then that, judging only by the method of diagnosis proposed by Trousseau, it would not be possible to distinguish this case from one of those rare cases of locomotor ataxy in which unsteadiness of gait is the only prominent symptom. But the other affections in this case—the vertigo and confusion of mind, the expression of the eyes, the slight paralysis on one side of the face, and the difficulty of articulation,—all indicate the cerebral origin of the disease. There

are cases, however, in which ordinary paralysis, arising from disease either of the brain or spinal cord, or perhaps of both, is really complicated to a variable extent with locomotor ataxy; and in which, therefore, the diagnosis is more or less difficult. But then, as must be evident, paralysis and ataxy cannot affect the same muscles at the same time; and therefore, when ataxic muscles have been paralysed, and regain their motor power, the ataxy increases in the inverse ratio of the paralysis. The following is an instance in which ordinary paralysis, arising from cerebral disease and common spinal softening, coexisted with locomotor ataxy. The notes, together with the medulla, pons Varolii, and spinal cord, were furnished me by a friend. Although the notes are not quite so explicit as might be wished, it is evident, from the description and from the post-mortem changes which I found, that it was a mixed case of locomotor ataxy.

CASE IX.—“T. M., æt. 42. Writer and grainer. He used white lead, and had had colic sixteen years ago. His father had suffered from gout and rheumatic fever. Had never had gout or rheumatism himself, and denied ever having had syphilis. His urine was albuminous, and there was once slight œdema of the ankles.

“Six years ago, for some months he saw double. He had had two attacks of giddiness—one four years ago, and another two years ago. In the first he was seized in a moment, and vomited. He continued to be sick for an hour, and was giddy all night. He fell, but did not lose his consciousness, and was not convulsed.

“Six months back he began to feel general weakness in both legs, especially in the left, and also in the left arm. He noticed that he could not get up a hill to his usual work, but not from any difficulty of breathing. He felt, he said, as if his legs were fixed to the ground. He had also a feeling of stiffness about his mouth, so that he could not get his words out. About the same time his sight began to fail; he could not see so far. He had now paralysis of both third and sixth cerebral nerves. The pupils were of equal and moderate size. There was no evident ptosis. There was nowhere any evident paralysis except in the muscles of the eyes. He complained, moreover, of numbness in his fingers, and said he could not feel any thing well. Although there was no obvious paralysis, he complained of a difficulty of walking. There was never any evident loss of sensation, but he said he could not hold a sixpence between his fingers unless he looked at it. He had had no numbness in his feet. He was one day found hemiplegic on the right side and speechless, but the next day he could speak well. The attack passed off in a few days, but he was much

shaken by it. The above symptoms continued with increasing weakness to the time of his death.

"Several small clots were found in the brain ; the left ventricle of the heart was hypertrophied, and the kidneys were granular. The spinal cord, medulla oblongata, and pons Varolii, were sent to Mr. Lockhart Clarke for examination."

I found both the third and the sixth cerebral nerves so much atrophied that they consisted of but little more than their neurilemma ; but the pons Varolii and medulla oblongata were otherwise healthy. In the spinal cord different kinds of lesions were observed in most parts of its length. In the cervical enlargement the posterior white columns had undergone, to a greater or less extent and degree, the peculiar gray degeneration which is common in locomotor ataxy. In some sections this morbid change was limited entirely to the lateral divisions of the posterior columns. Moreover, the central gray substance was in many places softened, and contained numerous but small areas of fluid disintegration.

In the dorsal region the posterior columns retained scarcely any traces of the *gray degeneration*, but were in many places affected, more or less, by common *white softening*, and the membranes around them were thickened and adherent. In the lower part of the dorsal, and upper parts of the lumbar region, not only were the posterior columns damaged in a similar way, but the central gray substance was likewise frequently softened. There was scarcely, however, any trace of gray degeneration of the columns.

There is no doubt, then, that this was a mixed case, partaking both of ataxy and partial paralysis. Although the kind of gait and other voluntary movements are not described in the notes, yet the amblyopia, the diplopia, the atrophy of the third and sixth cerebral nerves, the numbness of the fingers, his inability to hold any thing between them without looking at it, and the morbid changes in the cord peculiar to ataxy, leave no doubt of its partaking of the nature of that disease ; while the other cerebral symptoms, with the clots in the brain and the white softening of the cord, point to the co-existence of ordinary paralysis.* It will be observed that

* Duchenne, in 1861, had never met with vomiting at an early period of locomotor ataxy, and he therefore seems to consider this symptom sufficient to distinguish this disease from apoplexy or tumours of the cerebellum. That vomiting in locomotor ataxy is rare, I allow ; but in the first case of this disease that I ever saw, it happened to be one of the most prominent and persistent affections. The patient was a well-known musical composer, about forty years of age, and of strumous diathesis. The unsteadiness of gait was for a long time preceded by rheumatic pains in all the extremities, by paralysis of both the third cerebral nerves, and by severe vomiting of

this man had once an attack of hemiplegia which lasted only a few days. This transitory form of paralysis, though rare, does sometimes occur in the pure forms of ataxy. Trousseau mentions a patient who had a sudden attack of hemiplegia of the left side, which passed off in eight days. His intellect was not at all affected, but he retained anæsthesia of the fifth pair of cerebral nerves, which came on with the hemiplegia, and he was attacked a few months later, at two different times, by paralysis of the tongue, which lasted only a few seconds, but from this moment there was hesitation in his gait, and locomotor ataxy advanced with fearful rapidity.

When cases are not strongly marked,—when the pains are not striking, and the chief symptoms consist of unsteadiness of gait and ocular disturbances, they may possibly be confounded with disease of the cerebrum or cerebellum. A case of cerebral disease, which I lately saw, is interesting both in itself and in relation to progressive locomotor ataxy.

CASE X.—This was a young man 28 years of age. His intellect was perfectly clear; the sight of both eyes was much impaired; he had a dull aching pain in the left arm; he felt weak in his legs, and walked like a man slightly intoxicated, and exactly like one who has locomotor ataxy, before the spasmodic kind of unsteadiness has supervened. Notwithstanding these points of resemblance to certain forms of progressive locomotor ataxy, the history of his case revealed facts which clearly showed that it was an entirely different disease. Here is his own account of his illness from the beginning. He woke one morning with violent pains in the back of his head, and creeping pains in the right side of his face. These symptoms recurred at intervals for some months, and then he had “a kind of bilious attack,” during which he retched violently, but brought up only a little yellowish-green and acid fluid, and sometimes nothing at all. While retching he had the severe pain at the back of his head, but this ceased with the

bile and acid. The vomiting recurred about every four or five weeks, in paroxysms which lasted several hours, and were attended with the most severe burning pains round the præcordia. The muscular incoördination which followed was at first limited to the lower extremities, but gradually extended to the upper, so that he was no longer able to write down the notes of his compositions. It partook very much of the spasmodic or jerking character; and at a later period, when he attempted to walk with the assistance of a companion, his legs were spasmodically thrown about in the most disorderly manner conceivable. At length he was unable to stand, or even sit up in his chair; and after a few weeks' confinement to bed, he quietly sank, with a deep slough on the sacrum, but without any cerebral disturbance.

vomiting. Three or four weeks later he was informed by his friends that he was paralysed, although he was not aware of it himself. Shortly after, while in bed, he happened to cover his *right* eye with his hand, and found that he could not see the candle. He therefore went to the Moorfields Ophthalmic Hospital, and remembers that something was said to be wrong with the optic nerve. Before long he became so weak as to be unable to walk, and at the end of six weeks the sight of his *left* eye became impaired. From that time both eyes got worse, until his sight was almost destroyed. He could then see best with the *right* eye, but could not distinguish faces. He could see a clock at twenty paces, but could not see the hands. Now and then he had pain in the globe of this eye. With the *left* eye he could distinguish only light and shade. He then felt no pain in it, but for some time it has given him severe pain.

When I saw him, rather more than two years from the beginning of his illness, his sight had very much improved. He could see best with his *left* eye, and now and then he could read small print well without glasses. With the *right* eye he could see small print at the distance of three inches. He had a lump about the size of a hen's egg, and like an enlarged gland, behind the sterno-cleido-mastoid muscle, on one side. His sexual power was not impaired, but he told me that he had formerly indulged to a great excess in venereal pleasure. There was no albumen in his urine. The paralysis with which he was attacked at an early period of the disease was incomplete hemiplegia of the left side; but when I saw him that side apparently was as strong, or nearly as strong, as the other; and the only peculiarity in his gait arose from the loss of muscular coördination, to which I have already referred.

The points which, in a greater or less degree, distinguish this case from one of locomotor ataxy are the limitation of the limb-pains to one arm, the violent pains at the back of the head, the great improvement which took place in the sight, the repeated attacks of vomiting, and the hemiplegia, the integrity of the sexual power, and lastly, the patient's early age. Now several of these facts, taken singly, have much less diagnostic value than the rest; but if, *taken singly*, they are rare in ataxy, and not uncommon in disease of the brain, then, if several occur together in the same case, they will form, *collectively*, a strong point of evidence in favour of brain-disease. Such are chiefly the attacks of vomiting and the temporary hemiplegia, the integrity of the sexual power, and the early age of the patient. In locomotor ataxy pains are not unfrequently experienced in the head; but they are "rheumatic" and flying pains, and felt mostly in front of

the head. When the sight is once impaired, it rarely improves, but more frequently deteriorates, until, if the patient's life be spared, the amblyopia terminates in complete amaurosis.

General paralysis of the insane is another disease with which locomotor ataxy may sometimes be confounded. When the characteristic symptoms of each are sufficiently well marked, there is no difficulty in the diagnosis. Thus, if the prominent features of the disease in question consist of mental derangement of a peculiar kind—of muscular trembling, particularly of the lips and tongue; of hesitation and mumbling in speech, with a peculiar, unsteady gait, there will be no doubt that the case is one of general paralysis of the insane; but now and then we meet with cases of each kind of disorder, which partake of the characters of the other to a greater or less extent, and then the diagnosis may become so extremely perplexing that nothing but the most searching examination and inquiry can save us from an erroneous conclusion. This remark applies more particularly to general paralysis, which occasionally shares, at an early period, some of the most prominent symptoms of locomotor ataxy, viz. strabismus, amblyopia, amaurosis, acute pains in the limbs, more or less anæsthesia, incontinence of urine, or dysuria, with a jerking or spasmodic gait; and several of these together may make their appearance even before there is any change observable in the state of the mind.

I have already shown that locomotor ataxy is sometimes complicated with ordinary paralysis. It happens also to be sometimes accompanied by muscular atrophy, although this complication is of rare occurrence. Now when the two diseases exist separately in different individuals it is scarcely possible to mistake the one for the other; but when they are conjoined in the same person, and the muscular atrophy is extensive, the proper characters of the locomotor ataxy may be so modified or obscured as to be either entirely overlooked, or considered as referrible to the former disease. On the other hand, there are certain cases of muscular atrophy that, at an early stage of the disease, might not unreasonably be mistaken for locomotor ataxy. Thus when wasting of the muscles affects the lower extremities, although at first it may

be scarcely perceptible to the senses, it may yet be sufficient to produce unsteadiness of gait. Moreover, it is sometimes attended with numbness, with lancinating and shifting pains closely resembling those of locomotor ataxy. Such a case I have now under treatment.

CASE XI.—The patient is a boot-maker, 65 years of age. One year ago he began to feel that he could not so well as usual grasp and guide his knife in cutting leather. This inability gradually increased; and soon after, on going to write, he found that he was unable to hold and guide his pen. Two or three months later he could no longer walk as usual. It was not that he felt any particular weakness, but that he could not “trust his steps;” he took shorter steps, staggered somewhat like a tipsy man, and could not succeed in putting his foot down in the exact place that he wanted. Sometimes he was unable to step out of the road on to the curb-stone without assistance; he was afraid to raise one foot from the ground lest he should fall; but the slightest assistance that would enable him to maintain his balance was sufficient. If he turned his head round to the right or left while walking, he became giddy, and would fall unless supported. He walked better when looking down at his feet. He was unable to alter his course suddenly, or turn sharply round, but could turn round without stopping if he described a considerable curve. About the same time as the unsteadiness of motion, he experienced pain in his legs and arms, but principally in the former. The pains were of a “rheumatic” character, shifting from one place to another, sometimes from the thigh-bone to the hip-joint; or fixing on the legs and shin-bones. Sometimes his legs feel as if they were being broken. The pains in the arms are not nearly so severe as in the legs, but he has some numbness in them, although none in the legs. It was not till about six months after the difficulty of walking, that he began to perceive a wasting of the muscles of both his hands. The wasting rapidly progressed, and in a few months extended to the fore-arms, arms, shoulders, and back. It was accompanied by frequent fibrillar movements. At the present time—not more than six or seven months from the beginning of the atrophy—both his arms are in a fixed state of semi-pronation. The backs of the fore-arms are nearly perfectly flat, the extensors being almost entirely gone. The lower parts of the fore-arms are quite flat, and the tendon of the flexor carpi radialis stands out like a thick cord. The second and third phalanges of all the fingers of both hands are stiffly flexed, so as to assume the appearance of claws. The palmar muscles are much wasted, the thenar and hypothenar eminences having quite disappeared. At the back of the hand the interosseous muscles are almost entirely gone, deep depressions existing between the metacarpal bones. The triceps extensor, which usually disappears later than the other muscles of the arm, is more wasted than the biceps. The muscles of the shoulders and back are considerably atrophied, and the back is stiffly curved forward. Neither

of the lower extremities are very much reduced in size; the muscles that appear chiefly to have suffered are the sartorius and part of the vastus internus; and yet the patient is unable to walk or even to stand without the support of two persons. Fibrillar muscular contractions are observed over the thighs, arms, shoulders, and back, rapidly but gently undulating, like a succession of irregular waves, or—as the patient himself fancifully, but not unaptly, describes them—“like the northern lights.”

Now it cannot be denied that during the first few months of the disease the symptoms had a strong resemblance to those which occur in many cases of progressive locomotor ataxy. There was the unsteadiness of gait, the inability to guide the movements of the hands, the severe “rheumatic” and flying pains, recurring at intervals; some numbness of the hands and fingers; and although there was neither strabismus nor marked amblyopia, there was—what is frequently the only ocular affection in locomotor ataxy—contraction of the pupils. There was one peculiarity, however, that might be considered as almost diagnostic—viz. that the loss of muscular coördination began in the upper instead of the lower extremities.

Syphilis, again, is a disease which may occasionally give rise to symptoms so nearly resembling those of locomotor ataxy, as to be somewhat perplexing in diagnosis. Thus syphilitic affections of the periosteum, or of the membranes at the base of the skull, may paralyse any of the cerebral nerves, and produce strabismus, diplopia, ptosis, or amblyopia. Periostitis, as is well known, is a common cause of severe pains in the extremities; and exostosis, periosteal swellings in the vertebral canal, and syphilitic deposits in the membranes of the cord, may be productive of pains, formications, anæsthesia, and even unsteadiness of gait. A knowledge of these facts suggests the importance of ascertaining whether the patient has recently suffered from primary or secondary syphilis; whether there is any existing evidence of syphilitic taint, such as sore throat, specific eruptions or nodes; and when such evidence is not sufficiently explicit, our means of diagnosis may be further assisted by the test of specific treatment.

Symptoms resembling those of locomotor ataxy may likewise occasionally result from chronic rheumatism, chronic myelitis, hysteria, paralysis consequent on diphtheria, and some

other affections; but in most of such cases the diagnosis is by no means difficult. In the functional disorders of the nervous system which form the sequelæ of diphtheria, we sometimes find groups of symptoms which simulate in a very striking manner those which are common in ataxy. Thus in the same individual there may be not only an unsteady and spasmodic or jerking gait, but numbness also of the fingers, hands, arms, and feet, so that the patient is compelled to guide his movements by the eye; a defect of sight; and a sense of constriction round the abdomen and limbs, as if they were tightly bandaged.* The previous illness of the patient, however, in addition to some other points of distinction, will generally afford sufficient grounds for a correct diagnosis.

The spasmodic or jerking kind of movements which so frequently attend the advanced stages of locomotor ataxy, may be occasionally observed in other disorders of an entirely different nature, particularly in children. Two instances have recently come under my observation. In both there was cerebral disorder, but no sufficient evidence that the spinal cord was affected.

Etiology.—On this point I need say but little more than that the circumstances under which the disease makes its appearance are so various that in those persons who are pre-disposed, almost any thing that depresses the nervous power, especially of the spinal cord, may prove an exciting cause. Such are cold, wet, fatigue, bad or insufficient diet, depressing emotions of the mind, and, I think, onanism. Suppression of habitual perspiration, particularly of the feet, and the removal of hæmorrhoids, have also in many instances immediately preceded the disease. But of all these causes, a prolonged exposure to the combined operation of cold and damp is by far the most common, as it is probably the most

* In an excellent paper, by Dr. Headlam Greenhow, on "Diphtherial Nerve-affections," a case of this description is recorded. The patient walked with difficulty, his gait was irregular and tottering, "his limbs jerking about from his inability to direct their movements." When he extended his fingers they were widely separated, and there were convulsive twitchings of a choreal character. He was unable either to dress himself or cut up his food. He had numbness of the hands and feet, a sense of constriction round the abdomen and limbs, and a partial loss of expulsive power over the bladder and rectum.—*Edinburgh Medical Journal*, August 1863.

certain in its effects. Of its fatal effects on the spinal cord, through its influence on the peripheral nerves, a striking example is afforded in Case VI.

Treatment.—One of the first considerations in the treatment of locomotor ataxy is to protect the patient from cold and damp, and place him in an equable temperature; for the opposite conditions invariably aggravate the pains, and hasten the progress of the disease. Indeed, there are some patients who scarcely ever experience pain, except at the change of weather. The whole of the body should therefore be enveloped in flannel; and I would further recommend a lining of silk to the back of the flannel shirt.

A wholesome and generous diet, with a moderate allowance of wine or beer, is the one best suited to the patient; and wonderful it is that, notwithstanding the agonies of pain which sometimes torture him day and night, his appetite is usually good, and his general health is frequently but little impaired. But whenever his appetite fails and his strength and health are invaded, bark and iron, strychnine and cod-liver oil, may be advantageously administered. To these medicines I have occasionally added nitro-hydrochloric acid with decided benefit. Preparations of silver, however, appear to exert a more direct or specific influence on the disease. The nitrate is that which has been mostly employed. In many instances it certainly not only diminishes pain, but increases the power of controlling voluntary motions. It may be given in doses of one-eighth of a grain, gradually increased to a grain, two or three times a day, after meals; and unless there be reasons to the contrary, it may be continued during several months; for it often fails to display its effects until after a period of many weeks. But it frequently does no good, and as frequently disagrees with the patient. Sometimes it irritates the bowels, and causes diarrhoea; sometimes it teases the bladder, and excites a frequent desire for micturition.* These unpleasant effects, however, may be mode-

* It appears, from the experiment of Cloez, that a large proportion of the nitrate taken into the stomach is decomposed and resolved into the oxyde and into metallic silver. Dr. Ramskill informs me that he has tried the oxyde in locomotor ataxy, and found it beneficial, without producing irritation of the bladder.

rated or checked by combining it with opium, with belladonna, or with cannabis indica, which, moreover, may contribute to assuage the pains that naturally belong to the disease. I have already remarked that these pains are aggravated by constipation, which so frequently troubles the patient. They are therefore relieved by purgatives, which tend to diminish the congestion that forms one of the conditions of the spinal cord. For the same reason, relief is afforded by dry-cupping along the course of the spine, but particularly in the cervical and dorsal regions, where the congestion is generally greatest.

Many other remedies have been employed, but none have succeeded in arresting the progress of the disease, although some of them have been found serviceable in allaying the severity of the symptoms. Sulphur-baths are perhaps the most efficacious; and mineral-waters, employed in the same way, have afforded some relief in the earlier stages of the disease. Turpentine has been recommended in irritation of the bladder with discharge, produced by retention of urine. Galvanism, iodide of potash, and ergot of rye have been tried, but without satisfactory results.

Pathological Anatomy.—In true locomotor ataxy the spinal cord is invariably altered in structure. Its membranes, however, are sometimes apparently unaffected, or are affected only in a slight degree; but generally they are much congested, and I have seen them thickened posteriorly by exudations, and adherent not only to each other, but to the posterior surface of the cord. Now the posterior columns, including the posterior nerve-roots, are the parts of the cord that are chiefly altered in structure. This alteration is peculiar, and consists of atrophy and disintegration of the nerve-fibres, to a greater or less extent, with hypertrophy of the connective tissue, which gives to the columns a grayish and more transparent aspect, and in this tissue are embedded a multitude of corpora amylacea. Many of the blood-vessels that traverse the columns are loaded or surrounded, to a variable depth, by oil-globules of different sizes. For the production of ataxy it seems to be necessary that the changes extend along a certain length—from one to two inches—of the cord. The posterior nerve-roots, both within and without the cord, are frequently

affected by the same kind of degeneration, which sometimes extends to the surface of even the lateral columns, and occasionally along the edges of the anterior. Not unfrequently the extremities of the posterior cornua, and even deeper parts of the gray substance, are more or less damaged by areas of disintegration.* The morbid process appears to travel from the centre to the periphery—that is, from the spinal cord to the posterior roots. In the cerebral nerves, on the contrary, the morbid change seems to travel in the opposite direction—that is, from the periphery towards the centres. From the optic nerves it has been found to extend as far as the corpora geniculata, but seldom as far as the corpora quadrigemina. With the exception of the fifth, seventh, and eighth pair, all the cerebral nerves have occasionally been found more or less altered in structure.

* See a paper with engravings, by the author, in *Lancet*, June 10, 1865.

J. LOCKHART CLARKE.

VII. RHEUMATIC IRITIS.

RHEUMATIC IRITIS is the designation which I mean to adopt for all cases of inflammation of the iris produced by sudden changes in the atmosphere, whether thermometric, from hot to cold, or hydrometric, from dry to moist. From these causes, and sometimes also through defective powers of assimilation, there arises an acid state of blood, manifesting itself by inflammation and effusion into the joints, by acid secretions from the skin and kidneys, and not unfrequently by inflammation of that delicate muscular curtain which regulates the supply of light to the eye. It is to this last form of rheumatism that I propose to draw attention, and to consider—

- 1st. Its symptoms and stages.
- 2dly. Its diagnosis and prognosis.
- 3dly. Its sequelæ.
- 4thly. Its treatment.

Almost the first symptoms complained of are dimness of sight and lachrymation. If by a lucky chance the patient seeks advice for these premonitory warnings, the pupil will be found sluggish and the conjunctiva slightly injected; but in general little or no notice is taken of such slight symptoms by the patient, and consequently the practitioner seldom sees this stage. In the course of a few hours fine rose-coloured vessels are seen radiating through the sclerotic to the cornea. These vessels are the anterior ciliary arteries, and this appearance constitutes what the old authors called *zonular sclerotitis*. The iris itself next becomes affected, its colour changes, the resulting hue depending on the natural colour: if blue, disease makes it green; if dark, rusty; and later on nearly all colours turn to red, either from large vessels running across the iris, or from effusion of lymph, or from extravasation of blood into its substance. The greenish colour probably depends upon the yellowness of the aqueous

humour, the result of its altered condition; this may be proved by paracentesis of the anterior chamber, after which the blue healthy colour reappears. The pupil now becomes involved; it is contracted, irregular, and immovable; its contraction, however, is not invariable, for I have within the last few months seen a case of rheumatic iritis where the pupil of the affected eye was considerably larger than that of the sound one. This very unusual appearance was, I believe, produced by effusion between the sclerotic and ciliary processes, causing pressure on the ciliary nerves as they passed to the iris. Almost if not quite coincident with these changes in the iris there occurs effusion of coagulable lymph into the pupil and posterior chamber; the result is adhesions of the iris, especially of its free margin, to the capsule of the lens, giving rise to what is called posterior synechia, or, if the whole circumference of the pupillary margin be involved, to synechia posterior totalis. If the attack occurs in a person lowered by previous disease or of broken-down constitution, patches of lymph are apt to form on the anterior surface of the iris; these, if not removed by treatment, suppurate, burst, and form hypopium; finally, as the disease progresses, the cornea becomes hazy, inflames and ulcerates, the contents of the globe escape, and total destruction of the eyeball ensues. The pain which accompanies this inflammation is peculiar; the eye itself is little complained of, but all the severe pain is referred to the supraorbital region. It is almost always increased at night, and patients constantly say they cannot lie down. When the choroid is implicated, the pain is referred to the whole of one side of the head, and is described as "shooting down the nose;" the latter symptom I believe to be peculiarly significant of effusion into the vitreous.

Having thus briefly considered the symptoms, we must pass to the consideration of the stages of the disease. These stages, as enumerated by authors, are three: the first characterised by increased vascularity of the sclerotic, discoloration and immobility of the iris, and by pain: in the second we find effusion of lymph, loss of sight, and increased pain: in the third, destruction of the eye takes place, the pupil is closed, the eye soft to the touch; in some cases the iris is seen protruding through an ulcer in the cornea; in others the

cornea remains perfectly clear, but the choroid becomes visible through the thinned sclerotic.

The diagnosis of rheumatic iritis is not a difficult one: the history of the case and the appearance of the patient are the main indications. Much has been said by authors about the danger of confounding iritis with rheumatic or catarrho-rheumatic ophthalmia, with corneitis, with retinitis, &c.; but it appears to me that very slight knowledge of the subject will enable a surgeon to steer clear of this danger. I must, however, admit that the diagnosis from certain cases of syphilitic and strumous iritis presents some difficulty; as in the former, patients will often resolutely deny the occurrence of primary disease, unless an eruption remains, which will settle the question. It may be asked, Can you distinguish between rheumatic and syphilitic iritis by the appearance of the eye alone? Only in certain cases, I believe, where the iritis is chronic and the ophthalmoscope can be used, this instrument displaying syphilitic deposit on the retina. German authors state and believe that in syphilitic iritis the pupil is always displaced upwards and inwards. In order to test the value of this statement I carefully recorded a number of cases of syphilitic iritis; and I find that the iris is less frequently displaced upwards and inwards than in any other direction; clearly, then, we cannot depend on the displaced pupil as a means of distinguishing between these two varieties of the disease. There is in the syphilitic affection less conjunctival inflammation, less intolerance of light, and a greater tendency to deposit of larger masses of lymph on the anterior surface of the iris, also a greater tendency on the part of these masses when formed to degenerate into pus. In strumous iritis the diagnosis is easier, as this disease is always the sequel of other strumous affections of the eye.

The prognosis in slight cases is most favourable, as the eye usually entirely recovers the effects of the inflammation; but when the patient has been neglected, and the iris has become completely adherent to the capsule of the lens, a very cautious opinion should be given; for although in some instances all the effused lymph has been absorbed under the use of mercury, the more common result is lasting damage to the eye.

Of all the sequelæ of iritis none are more common than permanent adhesion of the pupil to the capsule of the lens. This adhesion may be (1) total, the posterior chamber no longer communicating with the anterior; or (2) partial, little delicate bands passing from the pupillary margin to the capsule of the lens. Besides the pupil being changed in form and rendered immovable, lymph may be deposited on the capsule, giving rise to what is called *cataracta lymphatica*, or spurious cataract. Now these adhesions, whether total or partial, give rise to one of the most troublesome complications the oculist is ever called upon to treat—to wit, recurrent iritis. Fortunately we are now able to prevent, by an operation, the destruction of vision which would sooner or later occur from this complication. There is another and equally serious affection which not unfrequently is a sequela of rheumatic iritis, viz. *irido-choroiditis*. The symptoms indicative of this disease are, in addition to those of iritis, increase of nocturnal pain, sparks or rings of light continually passing across the sight, gradual and constantly increasing intra-ocular pressure, then glaucomatous hardness of the eyeball, and if this be not relieved, destruction of vision.

Before entering into the question of what remedies we are to make use of, we must remember that the chief objects we aim at are: 1. to subdue inflammation; 2. to prevent effusion, or if effusion has already taken place, to prevent its organisation; 3. to preserve the pupil, and relieve the severe pain which usually exists. In the treatment of iritis, there is no remedy, if given judiciously, that produces so great an effect in subduing inflammation, and in preventing the effusion of lymph, as mercury. I find two grains of calomel, and a quarter to half a grain of opium, the best and most convenient form of administration; but it must be always borne in mind that salivation is not the effect required, and except in the slightest degree, it is rather to be avoided than promoted. The favourable result of this treatment mainly depends upon its being commenced early in the disease; and the following case, tolerably severe in its character, well illustrates this fact.

CASE I.—F. B., æt. 42; healthy-looking; was admitted under my care at the Ophthalmic Hospital on the 8th of November 1864. He

gave the following history. He had been subject to rheumatism for some years, and had been occasionally laid up from pains in his joints. Three days before admission he had been exposed to cold, and on the night of exposure was attacked with pain in and lachrymation of the right eye: subsequently, when the pain became severe, he applied at the hospital. On admission there was considerable conjunctivitis with some chemosis, concealing the sclerotic. The iris was discoloured and thickened; the pupillary margin was undefined, and for two-thirds of its extent adherent to the capsule of the lens; the aqueous was slightly turbid. He complained of severe pain in the eye, and around the orbit; the pain was worse at night, and prevented his sleeping. I gave him two grains of calomel, and a quarter of a grain of opium, every six hours, and ordered constant fomentation. On the 11th he was much better; the catarrhal inflammation had almost gone, the pupil was clearer, and the margin of the iris no longer drawn in; the pain was almost entirely gone; the gums were not sore, but there was a slightly metallic taste from the mercury: he was to continue the pill twice a day. On the 15th the iris was quite clear and well defined, and slightly adherent to the capsule of the lens at its internal inferior angle; the pupil was bright; there was no pain or conjunctival inflammation. As the gums were sore, he was ordered to leave off taking the pills, and to take decoction of bark with four grains of iodide of potassium three times a day, and to drop solution of atropine into the eye night and morning. On the 18th the adhesion of the pupillary margin had given way; the eye looked perfectly healthy, and there was good sight; a complete recovery having been effected in thirteen days from the attack.

Unfortunately patients seldom apply for advice thus early; consequently we are called on to treat cases where lymph is not only effused, but is becoming slowly consolidated, and yields but slowly to treatment. In these cases mercury has to be given for a long period,* and the gums kept just spongy. If this be done, the lymph, in a great measure, becomes absorbed, at worst a few tags only become organised, and a good recovery is made. There are, however, many cases in which large doses of mercury should be avoided, and the drug administered only in very small quantities—to wit, in persons of broken-down health or of phthisical tendencies. Under these circumstances I find a combination of two grains of quinine, three of blue-pill, and three of extract of hyoscyamus, most beneficial. I have had recently under my care

* In these cases I give the following prescription: R pot. iodidi gr. x.; liq. hydrarg. bichlor. ʒj.; decoct. cinchonæ ʒj.: ter quotidie.

a young strumous patient afflicted with rheumatic iritis, in whom a perfect recovery, without apparent damage to his general health, has taken place under such treatment. A very important question arises in relation to the period when mercury may be discontinued with safety. I hold a very strong opinion myself, that it should be persevered with so long as the sclerotic zone of vessels is visible; for so long as this symptom continues, a relapse may take place.

We must now pass to the consideration of the use of belladonna in these cases. Most authors recommend its use in every case, and in all stages of the disease. Gräfe says: * "the severity of the pain is by no means a contra-indication for this treatment: for the most severe ciliary neurosis often diminishes when the pupil dilates." "It should be applied daily, six, eight, or ten times, or oftener, at intervals of five minutes; and notwithstanding the irritation, both the pain and the other symptoms are generally alleviated." In very acute cases Gräfe applies atropine twenty or thirty times a day. Contrast this with the opinion of Mr. Dixon, one of the soundest practitioners in this country. "I do not regard it (atropine) as of any service in iritis; for, as I stated, an inflamed iris loses its power of motion. Atropine, therefore, must be useless during the active stage of inflammation. At a later period, when the iris is beginning to recover its motory function, it may, I think, even do harm; and in the following way: the hinder surface of the iris, termed uvea, is covered with a layer of pigment-cells; when fibrine is poured out behind the iris, these pigment-cells become for a time firmly united to the capsule of the lens; and if, when the iris is regaining its motory function, a forced dilatation of the pupil be effected by the influence of atropine, some of the pigment may be detached from the posterior surface of the iris and left adhering to the capsule, forming those brown patches so familiar to us in patients who have suffered from iritis."

I have quoted at some length these opinions, as showing how two men, both of vast experience, may differ on a point of treatment apparently so easy of decision. During the last seven or eight years I have had a very large number of these

* Vide monogram in New Sydenham Society's vol. for 1859.

cases under my care; and I have adopted the following plan, which appears to me to answer very well. In the early stage of the disease—that is, before the lymph is consolidated—a solution of sulphate of atropine, four grains to the ounce, is used every night and morning. When the attack becomes very acute, it is discontinued, because I have found (as Mr. Dixon states) the adhesions ruptured, and the pigment left behind on the capsule of the lens. When the lymph is being absorbed I again use the solution, as it dilates the pupil and stretches the bands attached to the margin of the iris. These at last give way; and as they are nourished by the iris (as shown by Gräfe), become atrophied when detached from it.

From these remarks on belladonna it will be perceived that I do not believe in its curative effect, but that I consider it only as a useful auxiliary to other remedies. Dr. Hughes Bennett holds that belladonna alone will cure iritis; and in his valuable work on Clinical Medicine relates a case to prove the fact; but if the case be analysed, it will, I think, be seen that mercury in any form was inadmissible, and that no practitioner of much experience in the treatment of iritis would have adopted other than tonic remedies. A man at twenty-five was attacked with severe rheumatism in the middle of March, and remained under treatment until the 10th of August. Towards the end of May cod-liver oil was given; which rather inclines me to think that Dr. Bennet considered his patient of strumous constitution. On the 7th of June inflammation of the conjunctiva set in, and on the 10th iritis was evident. The patient was cupped, blistered, leeches, and given quinine; and the eye was well in six weeks. Now iritis occurring in a case of this description is sure to be of a low type; and the only question is, whether the belladonna and quinine without any bloodletting would not have been sufficient. There are certainly few surgeons who would like to administer mercury to a young man who had been laid up with rheumatism for three months. The following case illustrates well the use of quinine when mercury has failed to arrest the progress of the disease.

CASE II.—J. R., æt. 48, a carpenter; thin, pale, and cachectic-looking; was admitted under my care with rheumatic iritis in the right eye. He gave the following history. Three weeks before admission

he caught a severe cold in the eye ; and two days after, symptoms of iritis came on. He applied to a surgeon, who gave him pills and blistered him. On admission he was profusely salivated. He complained of circumorbital pain and occasional attacks of darting pain through the eye. The conjunctiva and sclerotic were both inflamed ; the aqueous humour was turbid ; the iris appeared as if some blood was extravasated into its substance ; the pupil was irregular, and adherent to the capsule of the lens. The pulse was very small and weak ; and the man was so depressed with pain and want of sleep, that he almost cried when spoken to. I ordered him two grains of quinine every six hours, and constant poppy fomentations. Subsequently solution of atropine was used. He made a most excellent recovery, the sight being very good. In this case the tonic treatment was continued for some time after the eye was well, and the man's health was by this means quite restored. I thought at the time that the mercury having been pushed too far was the cause of the extreme weakness noted ; and this opinion was subsequently confirmed ; for some months after his discharge he returned with iritis of the opposite eye. Having, however, grown wiser by experience, he came at once to be treated ; and as the disease was only in the first stage, I used belladonna, and gave him small doses of calomel and opium. He was well in a week, without any damage to the sight.

I must not quit the subject of treatment without mentioning the use of leeches in some cases when the pain is very severe. When the patients are of robust frame and have a full pulse, a few leeches will often arrest the paroxysm of pain, which usually comes on at night ; but in the vast majority of cases the pulse is weak, and I find that a draught containing from three to five drops of Fleming's tincture of aconite, with or without colchicum wine, usually procures sleep. Indeed, in early and not severe cases, occurring in pale weak individuals, I find aconite and colchicum taken every eight hours, and solution of atropine used night and morning, will effect a cure.

The following case, one of many thus treated, may be related.

CASE III.—M. B., æt. 26, came under my care on April 17th. She complained of pain in and lachrymation of the right eye, which had come on the day before, after getting wet. The conjunctival and sclerotic vessels were congested ; the iris was sluggish, but there were no adhesions. She was ordered tinct. aconiti (Fleming's) \mathfrak{mij} . ; potass. bicarb. gr. xv. ; vin. colchici $\mathfrak{m}\mathfrak{v}$. ; aquæ distillatæ \mathfrak{zj} . : ter quotidie. A blister was applied behind the ear, and warm fomentations to the eye. On the 23d all the inflammation had gone, the iris acted well,

and there was no pain. Being somewhat depressed by the treatment, she was ordered decoction of bark and chloric æther; and by the 1st of May she had perfectly recovered.

Blisters are of great use when the pain spreads over the head, and especially if the sclerotic inflammation be severe. Turpentine has been extolled as a remedy; but I have never seen any good result follow its employment in these cases.

We must now pass to the treatment of the complications of iritis—viz. irido-choroiditis and recurring iritis. We will first consider the effects produced by iritis passing on to irido-choroiditis. The symptoms of this grave complication I have already sufficiently described above, and of them stated that intra-ocular pressure was the striking symptom. This is now regarded by oculists as a glaucomatous condition, and supervening on iritis; for many diseases not originally glaucomatous may become so from intra-ocular pressure. On this point I cannot do better than quote Mr. Bowman: "Whatever the essential nature of the glaucomatous state, we, as practitioners, are chiefly concerned with the augmented tension of the eyeball which attends it. This we have to distinguish at its earliest stage, and towards the mitigation of this our treatment is to be directed. As a practitioner having to relieve disease, I call all undue tension of the eye glaucomatous tension. The object of treatment is to reduce this within natural limits; for if it continue, the result is inevitable."

In deciding about intra-ocular pressure, care must be taken to ascertain its extent. This must be done, not by carelessly putting one finger on the eye, but by a really painstaking examination in the manner laid down by Bowman, placing the forefinger of the left hand in the inner canthus, and pressing the eye gently with the forefinger of the other hand. In this simple manner an accurate knowledge of the amount of tension existing will be arrived at. To illustrate this portion of my subject I will very briefly relate a case:

CASE III.—M. T., æt. 50, was admitted into the Ophthalmic Hospital suffering from irido-choroiditis, the result of neglected iritis. When first seen, she complained of intense pain in the eyeball, around the orbit, spreading over the whole of the head, and especially down the nose. The eye was very tense and tender to the touch; she con-

stantly saw rings of fire passing across her eye; she could not sleep; and there was loss of vision. I performed cylicotomy* (Hancock's operation) at once. The pain of the operation having passed away, she at once slept, and had no return of pain. She was discharged with useful sight. I saw her again some months later, and she had had no return of pain.

I also make use of this operation as a means of relieving pain in cases of extreme suffering; and I quote the following case, which was unsuccessful so far as sight was concerned, to show what an immediate relief from suffering is obtained. I may also state here that I believe in all cases of iritis where the pain is severe and the aqueous humour turbid, paracentesis of the cornea may always be performed with advantage.

CASE IV.—T. B., æt. 38, a railway labourer, thin, and of cachectic appearance, was admitted into the Ophthalmic Hospital November 25th. He stated that for ten months previous to his admission he had been very subject to rheumatism, which had affected all his joints at different times. About a fortnight before admission he was attacked with pain in the right eye and around the orbit. On his admission, the iris was contracted and adherent to the capsule of the lens. The sclerotic and conjunctiva were both inflamed. He complained of intense pain, which was much increased on his lying down. He said he had had no sleep for some nights. He could see light and discern objects dimly; but in the course of a few days he entirely lost the sight of the eye. He was treated by doses of calomel and opium; and as the pain was so intense, he was given five drops of tincture of aconite three times a-day. The gums became affected on the 1st of December. The calomel was then omitted, and the aconite was continued, some wine of colchicum being added. At this time there was a large nodule of lymph situated at the upper and outer part of the iris, quite close to the margin of the cornea. The sclerotic and conjunctiva were both extremely congested, the iris thickened and red, the pupil occluded, except at the lower part. On the 5th the nodule of lymph had suppurated and burst, forming hypopium. On the 6th the pain was so intense that, as the hypopium was increasing, I thought it right to perform paracentesis by means of cylicotomy. The whole of the pus escaped by the side of the knife with the aqueous humour.

* Cylicotomy, section of ciliary region. This term I think merits adoption, on the ground, first, of being more concise than the present phrase in use; and, secondly, being more in accordance with the general nomenclature of the ocular region, which is Greek. It is compounded of *κυλικός*, *ciliary* (derived by analogy from *τὰ κύλα—κύλον*, Lat. *cilium*,—as *ξυλικός*, *wooden*, from *ξύλον*), and *τομή*, *a cutting*, from *τέμνω*, *I cut*.

The day following the operation the pain had almost entirely ceased, and the anterior chamber was free from pus; but the iris appeared much disorganised. From this time he rapidly recovered, never having any return of pain. He was discharged on the 16th of December in a healthy state, but with very little or no sight.

Recurring iritis is the most troublesome of all the sequelæ of an inflamed iris, and depends upon the existence of posterior synechiæ. This is proved by the fact that when no adhesions remain after an attack of iritis, no tendency to recur exists. Again, when the adhesions are few and admit of considerable motion, recurrences are not common; but when broad adhesions exist, or if there is total adhesion of the margin of the iris to the capsule of the lens and spurious cataract constantly recurring, iritis is inevitable. The pupillary margin of the iris being fixed to the capsule of the lens, the iris is seen bulging forwards, and having a funnel-shaped appearance. This arching forwards is caused by effusion behind the iris, which probably itself acts as an irritant. Whatever may be the cause, it is certain that exposure to the slightest cold will produce an attack of inflammation in these cases; and after each attack the sight (if sight exists) is deteriorated, and at length complete atrophy of the eyeball ensues. In order to prevent this calamity, every case of iritis ending in total posterior synechia should be operated on; and I am sure, if this were done, blindness as a sequel to recurring iritis would be almost (if not quite) unknown. The operation to be performed in these cases is iridectomy. By its means a large pupil is obtained, which relieves tension, restores the communication between the anterior and posterior chambers, gives good sight, and prevents further attacks of inflammation.

The following case, which I will give in a few words, shows the great benefit of the operation:

CASE V.—S. C., æt. 29, a laundress, much exposed to rapid changes of temperature, was admitted into the Ophthalmic Hospital in October 1862, with the following history: She had been subject to rheumatism for some time, and three years ago had rheumatic iritis in the left eye, for which she was treated in the usual way. She came under my care in 1860, for her third or fourth attack of iritis. I then advised iridectomy, which she declined having performed. She went on having attacks every five or six months, until October 1862, when she came

into the hospital, consenting to have the operation performed. She could then just see light with the left eye, and had much pain around the orbit and in the eye. The pupil was very irregular in shape, and completely adherent to the capsule of the lens, and a thin layer of lymph filled-in the contracted pupil, the choroid being visible (through the thinned and inflamed sclerotic) around the cornea. I at once performed iridectomy, and with the best effect. Not only was the pain relieved, but she could see all objects perfectly and read large print (No. 16). She came to me some months after her discharge, not having had any attack of inflammation, and with good sight.

In chronic iritis, when other remedies fail, iridectomy ought to be performed, as it gives the patient a much better chance of preservation of sight, and prevents the general health suffering from too long-continued treatment. I operated recently in a case of iritis which had existed for nearly six months, and all the usual remedies had been resorted to without benefit. One week after the operation all the pain had ceased, and shortly afterwards fair sight was obtained.

From the foregoing remarks I deduce :

1st. That in early and slight cases of rheumatic iritis alkalies combined with colchicum and aconite are remedies effectual to arrest the disease.

2dly. That adhesions once having been formed between the pupillary margin and the capsule of the lens, the use of mercury in some form is essential.

3dly. That atropine is always necessary during some stage of the attack.

4thly. That in cases of severe pain and slight tension the operation of cyclicotomy, or paracentesis through the cornea is advisable.

5thly. That in cases of recurring and chronic iritis iridectomy is absolutely necessary to prevent blindness.

JAMES ROUSE.

VIII. CEREBRAL SYMPTOMS OCCURRING IN CERTAIN AFFECTIONS OF THE EAR.

THE organ of hearing has very intimate relations with the brain. These arise, not only because the petrous bone is bounded above by the cerebrum and behind by the cerebellum, but also because the petrous bone contains within it the cochlea, vestibule, and semicircular canals, and within these are the expansions of the auditory nerve. And it would almost appear as if a morbid condition of these expansions of the auditory nerve produced symptoms analogous to those supervening upon a morbid condition of the brain itself.

Before making any observations on the cerebral symptoms which follow upon morbid excitement of the contents of the labyrinth, I may briefly allude to the results of the experiments performed by M. Flourens upon the semicircular canals. Thus he found that "section of the horizontal semicircular canal in pigeons on both sides induces a rapid jerking horizontal movement of the head from side to side, and a tendency to turn to one side, which manifests itself whenever the animal attempts to walk forwards. Section of a vertical canal, whether the superior or inferior, of both sides, is followed by a violent vertical movement of the head; and section of the horizontal and vertical canals at the same time causes horizontal and vertical movements. Section of either canal on one side only is followed by the same effect as when the canal is divided on both sides; but this is inferior in intensity. The movements continue to be performed during several months. In rabbits, section of the horizontal canal is followed by the same movements as are exhibited by pigeons; and they are even more constant, though less violent. Sec-

tion of the anterior vertical canal causes the animal to make continued forward 'somersets,' while section of the posterior vertical canal causes continued backward 'somersets.' The movements cease when the animal is in repose, and they recommence when it begins to move, increasing in violence as its motion is more rapid."*

Without placing implicit reliance on the results of these experiments, where other important organs must have been seriously injured besides those which were the immediate object of the operations, it may probably be inferred that the section of the semicircular canals produces effects which seem to derange the cerebral functions. In this communication I purpose to show that pressure upon the labyrinth produces cerebral symptoms, and that these are often of a very decided character.

In the first place it must be premised that a force exerted upon the malleus and the outer surface of the membrana tympani passes inwards to the base of the stapes and to the contents of the vestibule: consequently pressure upon the outer surface of the membrana tympani is tantamount to pressure upon the contents of the vestibule. The symptoms produced by pressure upon the vestibule are a sense of giddiness, an inability to walk straight, and loss of distinctness of vision, and sometimes a feeling of numbness in the affected side of the head; these may be accompanied, or not, by great depression of spirits. This depression of spirits, which, as will be seen, has no relation to the mental discomfort produced by the attendant deafness, commonly results from the continuous pressure exercised on the vestibule by the falling-in of the membrana tympani consequent upon the closure of the Eustachian tube. Pressure upon the stapes, and thereby upon the contents of the vestibule, is usually produced from the following causes:

1. The presence of cerumen and epidermis upon the outer surface of the drum.
2. A foreign body upon the outer surface of the drum—cotton-wool or the artificial drum, for example.
3. A polypus upon the outer surface of the same organ.
4. A forcible drawing inwards of the drum from the ex-

* Carpenter's *Physiology*.

haustion of the tympanic cavity in cases of occluded Eustachian tube.

There is still another source of giddiness and partial insensibility, viz. pressure upon the *inner* surface of the membrana tympani. Thus, if I hold the nose tightly, and then blow air forcibly through my Eustachian tubes, the air is felt gradually to distend the tympanic cavities; the drum is felt to be pressed outwards, and then, the tympanic cavity being fully distended, there remains merely a sense of distension. But if this pressure be continued, a feeling of light-headedness and a sense of swimming ensues, which disappear upon the withdrawal of the pressure. These symptoms probably depend not upon the pressure exercised upon the contents of the labyrinth, but upon the forcible pressure outwards of the drum, and the consequent outward traction of the base of the stapes, which deranges the normal state of the labyrinth. It is well known that forcible distension of the tympanic cavity by the air-press and Eustachian catheter has been productive of instantaneous death; and it is not improbable that the cause of death was the rupture of the membrane of the fenestra rotunda, or the dislocation of the stapes from the fenestra ovalis, permitting the air to enter the labyrinth.

Symptoms of giddiness are not only produced by *pressure* upon the outer surface of the membrana tympani, but by the application of cold and sometimes even of hot water to this surface. These symptoms may possibly be produced by the conduction of the cold or the heat directly to the vestibule by means of the chain of bones, or to the violent reflex action of the tensor tympani muscle, suddenly and forcibly pressing inwards the stapes against the contents of the vestibule. But the fact should never be forgotten that the operation of syringing the ear with cold or even with cool water may produce not only a feeling of giddiness, but also complete insensibility.

CASE I.—*Giddiness produced by the pressure of cerumen upon the outer surface of the membrana tympani.*—W. B., æt. 50, an artist, walked into my consulting-room and complained of deafness and noises in the ears and head. He stated that these symptoms had recently appeared, and were lately so much aggravated, that when endeavouring

to take a portrait, the features of the sitter became indistinct; when endeavouring to write a letter, the words became confused; and lastly, when walking to consult me, he became so giddy that he was compelled to stop for some time and support himself by the railings in the street. Upon inspection, a large quantity of cerumen was found in each meatus; this was removed, and the symptoms wholly disappeared.

Drowsiness, giddiness, and a feeling of sickness following the use of the artificial drum.—Of the several hundreds of cases in which I have applied the artificial drum, there have been a few in which the too-forcible pressure inwards of the membrane has been productive of unpleasant head-symptoms. The reason that these symptoms are rare probably is, that, as a general rule, the remaining portion of the drum has sufficient power to re-act against the pressure of the elastic artificial membrane, and thus to prevent the inward pressure of the base of the stapes. In the following case, and probably in the other cases where giddiness was produced by the pressure of the artificial drum, a soft polypus close to the drum was squeezed by the artificial membrane, and kept up a continuous pressure upon the chain of bones.

CASE II.—M. G., æt. 14, had long suffered from deafness in each ear, accompanied by discharge. Each membrana tympani was perforated by a large orifice, and in the right ear close to the posterior and inferior part of the membrana tympani was a small raspberry polypus about the size of a grain of rice. An artificial drum was applied to each ear, which at once produced a marked improvement in the left ear, so that with it my voice was heard, even when low, across my room. The improvement in the right ear was less manifest. He left me with his mother; and as soon as he was in the street he said that a feeling of drowsiness appeared to be coming over him, then he felt giddy and sick. Acting up to my usual advice, that if any unpleasant feeling results from the presence of the drum, it is to be withdrawn, his mother at once removed the drum from the right ear, which the boy thought was the cause of the discomfort, and the unpleasant symptoms at once vanished.

Giddiness and insensibility produced by pressure upon a large polypus protruding from the ear.—The following case is condensed from my work on the diseases of the ear:

CASE III.—H. H., æt. 58, a washerwoman, strong, stout, and in good health. Seven years previous, when consulting me, a discharge issued from the left ear, and was followed by a round tumour at the orifice.

About a year before seeing me the right ear began to discharge, and a swelling soon followed. In this ear great noises were experienced; sometimes they were like a humming, at others like the tinkling of a bell, and then as of a bell ringing loudly. Whenever the surface of the polypus in this ear is pressed upon, she feels giddy; and if the pressure is continued, she loses her consciousness and falls to the ground. The polypus was extracted by means of the ring-forceps, and in a few days all symptoms of giddiness disappeared.

I may refer, in passing, to another case—that of a lady who consulted me on account of pains extending over the side of the head, frequent attacks of giddiness, great depression of spirits, and a sense of pressure within the ear; all of which symptoms disappeared with the removal of a polypus from the ear.

CASE IV.—*Depression of spirits following closure of the Eustachian tube, and pressure inwards of the membrana tympani.*—J. B., æt. 16, a Rugby boy, and son of a medical man, was brought to me some years since on account of deafness in one ear, the other being perfect. His friends stated that he was naturally cheerful, but since his return from Rugby for the holidays he was observed to be moody and downhearted, and nothing seemed to make him bright. After some days, by accident, one ear was found to be deaf. On examination the membrana tympani was found to be very concave externally, and the drum presented other characters indicative of obstruction of the Eustachian tube. The tube was opened, and at once the patient exclaimed that he was cured: and not only had the deafness disappeared, but, as the patient's face indicated, the depression of spirits had vanished.

CASE V.—*Giddiness produced by pressure on the outer meatus of the ear, the Eustachian tube being closed.*—M. M., æt. 30, has been deaf at times during a cold for fifteen years. Lately the deafness has come on more markedly and continuously, and accompanied by giddiness on pressure of the right outer meatus. Upon inspection, it was evident that each Eustachian tube was closed. Upon pressure of the outer meatus, so as to compress the air in the meatus, and consequently to press the membrana tympani inwards, a feeling of giddiness is produced; and if this is continued, a feeling of swimming in the head is so overpowering that he is obliged to hold his head between his hands. A feeling of weight in the eyeballs and indistinctness of vision also follow, so that in looking at a statue he is unable to distinguish the parts in shadow. After pressure for a minute or two, he remained as long as ten minutes before he recovered completely. This pressure upon the ear was practised on account of the improvement in the hearing which often followed the operation—a result apparently due to the release of the base of the stapes from the fixed condition it had assumed in the fenestra ovalis; for it was observed that after pressing on the meatus

he suddenly and quickly withdrew the finger, so as to allow of a certain amount of rebound in the membrana tympani.

Numbness of the right side of the head accompanying closure of the Eustachian tube. Cure.—M. J., æt. 25, consulted me on account of deafness in the right ear. It came on two months previously, after a cold, and was accompanied by a feeling of numbness over the right side of the head, extending from the temple over the mastoid process. The membrana tympani was very concave externally, dark, and its surface glossy. Air was blown into the tympanum through the Eustachian tube, and the effect was instantaneously to improve the hearing, so that conversation could be heard perfectly with that ear, and the sense of numbness at once disappeared. The symptoms of deafness and numbness slightly recurred on the following day from the partial closure of the tube; but they again vanished with the reintroduction of air into the tympanum; and as the Eustachian tube was brought to a natural state, so that it could be opened by its muscles, all unpleasant symptoms disappeared.

Giddiness and syncope following the use of a syringe and cold water to the outer meatus of the ear.—A policeman, between forty and fifty years of age, applied for advice on account of deafness. On inspection, the meatus of one ear was found to be distended with cerumen. The house-surgeon was requested to syringe the ear; and while so doing, the patient first rolled on one side of his chair and then rolled upon the floor insensible. I ordered him to be stretched at full length, and placing my fingers in the water which was being used, at once detected that the cause of the syncope was its coolness.

Cases exactly similar to the above, excepting that the cause of the syncope was hot instead of cold water, might be cited here. The concussion of the drum, the chain of bones, and the contents of the labyrinth, by a sudden and unexpected loud sound, is not only accompanied by singing in the ears, but also by very distressing head-symptoms of a character similar to those already described.

JOSEPH TOYNBEE.

IX. ON SOME POINTS CONNECTED WITH THE TREATMENT OF HERNIA.

ALTHOUGH probably few subjects within the domain of surgery have been more frequently or elaborately discussed than the treatment of hernia, yet there still remains, upon several important points connected with it, so much difference of opinion, that an examination of a few of the disputed questions, with a short account of the practice usually pursued at this Hospital, with the results thereof, and some deductions therefrom, may perhaps be not without use or interest.

The following remarks, however, will apply only to the more common forms of hernia, and will not concern at all those rare varieties which occasionally occur, and which are described in works upon the subject; because each such case must require a treatment peculiar to itself, and varied according to the particular circumstances incident to it. The treatment of strangulated hernia will be first considered.

During the last twenty years, the advance of pathology and the accurate observation and record of cases have led to much improvement in the treatment of this condition; and to any one looking over the history of this branch of surgery, two facts become particularly apparent. The first is, that in the works of each succeeding writer there is an increased insistence upon the danger of forcible and long-continued taxis; the second, that with the increase of surgical and pathological knowledge, there is a corresponding decrease of the time allowed to elapse between the event of strangulation and the operation requisite for its relief. And nothing can be more evident from the observation of cases of strangulated hernia than the advantage of an early operation, and the

danger of violent and prolonged taxis. Not that it is not of course most desirable, if possible, to return the intestine without the aid of the knife; but that much valuable time may be lost, and much injury done, by the prolonged persistence in methods which at last prove useless. How long, then, should we wait, and what measures should we employ, for the reduction of a hernia before proceeding to operate? This must depend on the general symptoms and the state of the hernia. We may venture to wait longer if the hernia is of old date than if it is of recent origin; an inguinal hernia will admit of more delay than a femoral; and a great proportion of the congenital cases may be returned without operation. One thing is, however, certain, viz. that the danger to the patient is in proportion to the time that strangulation continues. For the following is the relation of the mortality to the time of strangulation in the cases that have been operated on in this Hospital during ten years. Of those operated on for inguinal hernia on the

1st day of strangulation,	1 in 6	died.
2d " " "	1 " 2.5	"
3d " " "	1 " 1.6	"

and of those operated on for femoral hernia, on the

1st day of strangulation,	1 in 10	died.
2d " " "	1 " 4	"
3d " " "	1 " 3.8	"
4th and 5th " "	1 " 3	"
6th " " "	1 " 2	"
beyond this . "	1 " 1.5	"

Or, to put it in another form: of all the cases operated on during ten years, those that recovered had had the bowel strangulated for an average time of thirty-nine hours, and those that died for an average time of seventy-five hours. It is evident, therefore, that it should be the rule to operate early, and as soon as it is decided that the hernia is not likely to be returned by moderate and safe means. The amount of taxis used should be in inverse proportion to the tenderness of the tumour and the urgency of the symptoms, and it may be persisted in safely for a longer time in the inguinal than in the femoral variety.

Of the auxiliaries to the taxis it is necessary only to speak

of two, viz. chloroform and ice; for at this, as at most other hospitals, all others have been relinquished in their favour. The tobacco-clyster, for instance, has not been attended with sufficient success to warrant its administration, which is by no means free from danger. Fatal cases are recorded by A. Cooper,* B. Cooper,† Teale,‡ Desault,§ Velpeau,|| and others. Purgatives by the mouth can only do harm, by increasing the irritation and congestion of the bowel; but in fact they are generally rejected by the stomach. The opinion advocated by some, that the purgatives, by stimulating the peristaltic action of the bowel, are likely to cause its reduction, is utterly untenable. For, in the first place, if the bowel is inflamed, it is incapable of performing its functions, and the purgatives will not excite the peristaltic movements; and secondly, if it is not inflamed, they only tend to set up inflammation by mechanical irritation, and to increase the vomiting, and therefore the depression of the patient; and thirdly, if the peristaltic action were excited, it would be more likely to increase than to diminish the protrusion. Besides which, if the medicines are retained, there is the danger pointed out by Mr. Hancock, that after the bowel is released by operation, the accumulated action of the purgatives taking place, the patient may die from exhaustion by the excessive purging that results.¶ Bleeding and the hot bath were also frequently used to produce a relaxation of the tissues, favourable to the reduction of the hernia; but this effect may be much more certainly obtained by the inhalation of chloroform, with the advantage that if the bowel cannot then be returned, the operation may be at once proceeded with; no time having been lost, nor harm done to the patient.

The application of ice, or cold in some form, to the tumour, may be of considerable use in well-selected cases, if not trusted in too long. The cases to which this treatment is best adapted are those of large scrotal herniæ (occurring often in old persons) which are of the more passive character, and which consist principally of intestine containing a good deal

* On Hernia, part i. p. 33.

† Med. Gazette, vol. xxi.

‡ On Hernia, p. 106.

§ Jour. de Chir.

|| Nouv. Elém. de Méd. Opér. vol. ii. p. 352.

¶ On Oper. for Hernia, p. 59.

of gas. It may, however, be usefully tried in all cases of large inguinal hernia in which the symptoms do not appear to call for immediate operation; and in some it will cause the gradual diminution of the hernia piece by piece, and in others, after the application of the cold for some hours, the whole hernia may be reduced by gentle taxis, either with or without chloroform. But if there is stercoraceous vomiting, much tenderness of the tumour or abdomen, or severe depression, the time for the use of cold is past; chloroform then is by far the safest and most potent auxiliary.* And it is the rule at this Hospital, that if the symptoms are at all urgent, and the first attempt at reduction fails, the patient is put under chloroform (*i. e.* under the most favourable condition for the reduction of the hernia), and if it cannot then be returned, the operation is at once performed; or indeed, if taxis have been applied before the patient is seen, or it be a tight femoral hernia, chloroform may be at once administered without any previous attempt at taxis. It may seem the less superfluous to insist so much upon the care with which the taxis should be applied and the short time it should be persisted in, when it is considered that of fifty-five deaths from strangulated hernia occurring in this Hospital, thirteen of them, or nearly one-fourth, were distinctly referable to the forcible taxis that had been used before their admission.

With regard to the operation, the question presents itself, whether the sac of the hernia should be opened or not. At this Hospital it is the almost invariable custom to open the sac; in fact, of 181 operations for strangulated hernia, in only six was the sac not opened. This practice is supported by the authority of Sir Astley Cooper, Dupuytren, Key, Lawrence, South, &c. There are other surgeons, however, who consider that it is better not to open the sac, whenever the operation can be performed without doing so, unless there are some signs of gangrene of the intestine having taken place; and they can quote in their favour Sir Charles Bell, Petit, Monro, Luke, Bransby Cooper, Aston Key, Erichsen, &c. As, then, there are such eminent surgeons holding opposite opinions upon

* Mr. Bryant states (*Guy's Hosp. Rep.* 1861), that of seventy-eight cases of inguinal hernia reduced by taxis, nineteen per cent were reduced by chloroform, when all other means had failed.

this point, it may be worth while to state briefly the arguments and facts, such as I have been able to collect, on both sides of this question.

The principal arguments adduced in favour of the performance of Petit's operation, or that without opening the sac, are shortly these: (*a*) that there is less danger of peritonitis following the operation; (*b*) that less injury is done to the intestine; (*c*) that the operation approximates more nearly to the simple taxis than any other—that therefore there need be less hesitation in operating early; (*d*) and that it is less fatal than that in which the sac is opened.

On the other hand, if the sac is opened, (*a*) the state of the intestine can be accurately determined, which it cannot if the sac is not opened. And this might materially alter the treatment, and is most important; for gangrene of the intestine may take place with very few symptoms to indicate its occurrence; and when the advocates of Petit's operation state that it should not be performed in cases where gangrene of the intestine is imminent, they give a means of selection which it is impossible practically to use; for even Mr. Pott, whose large experience should carry great weight, said "that the time in which a piece of gut will become gangrenous from stricture, or get into a state approaching gangrene, is extremely uncertain, and depends on circumstances which no man can foresee."* Then again, the strangulation may depend upon adhesions, upon the thickening of the sac, or upon omental constriction or entanglement; cases of which are given by Velpeau,† Scarpa,‡ Prescott Hewett,§ and Hancock;|| and these would escape detection were the sac not opened. Home,¶ Cock,** and Hancock,†† relate cases which proved fatal from strangulation having continued owing to the sac not having been opened. Also (*c*) if the sac is not opened, there

* Chirurg. Works, vol. ii. p. 77. See also a case related by Mr. Hutchinson in *Lond. Hosp. Rep.* vol. ii. p. 105, in which fatal peritonitis occurred from the return into the abdomen of a portion of intestine in a gangrenous condition, which had not been detected in consequence of the sac not having been opened.

† Dict. vol. xvi.

§ Med.-Chir. Trans. vol. xxvii.

¶ Dub. Hosp. Reports, 1833.

†† Op. cit. p. 34.

‡ Mémoire, ii. p. 24.

|| On Oper. for Hernia, p. 33.

** Guy's Hosp. Reports, vol. v.

must frequently be a quantity of fetid fluid, contained in the sac, returned into the abdomen, which must be highly injurious. It may be said in answer to this, that there is also the danger, if the sac is opened, that if a vessel be wounded, the hæmorrhage is likely to take place into the abdomen; but this is of such rare occurrence, that it cannot be given much weight; neither, when it does take place, is it necessarily fatal, as has been shown by Mr. Lawrence* and Mr. Hancock.† Then (*d*) concerning the injury to the intestine, the advocates of Petit's operation say that if the sac is opened there is (1) more danger of wounding the intestine; (2) more danger of rupturing the intestine. Now, it has been clearly shown by Mr. Hancock‡ that there is actually more danger of wounding the bowel in Petit's than in the ordinary operation; for in the first the dissection is made down to the bowel, just in that part where it is most tightly constricted, and therefore most closely adherent to its coverings; but if the sac is opened, instead of a dissection down to its neck, the incision is made at the lower part, where it is least adherent, and where, if there is any fluid (as there commonly is), it is separated from the bowel by that fluid. And secondly, as to rupturing the bowel; in the first place, if the condition of the bowel is one in which rupture is likely to take place, the supporters of this operation say it is not a fit case for it; and in the second place, opening the sac does not alter the condition of the bowel, and there must be just the same danger of rupturing it, whether the sac is opened or not. And in the last place, if the intestine does give way, there is this disadvantage in not having opened the sac—that the contents of the bowel must go into the abdomen, and a fatal result is certain; whereas if the sac is opened, they can escape externally, and there is a chance of recovery. Next, with regard to the peritonitis, (*e*) it must be proved that this depends on the opening of the sac before it can have any weight. Now, in many cases the peritonitis exists before the operation, therefore in these the incision of the sac cannot have caused it; and in those cases where it occurs after the incision, we do not find the peritoneal inflammation extending from the in-

* On Rupture, p. 271.

† Op. cit. p. 23.

‡ Op. cit. p. 18.

cised sac, but from the locality of the returned bowel.* And it must be remembered, as Mr. Skey remarks,† that the sac of a hernia is quite an altered structure from the peritoneum of which it once formed a part, and derives, after a short time, even its blood-supply from the tissues to which it becomes adherent. We do not find abscess of the sac, after the operation, extending into the abdomen, nor peritonitis extending from the abdomen into the sac. Lastly (*f*), it is said that Petit's operation is less fatal than that in which the sac is opened. But this statement seems to be entirely founded upon a fallacious quotation of statistics, which in reality do not sustain it. In Mr. Luke's paper on the subject, published in the 31st vol. of the *Medico-Chirurgical Transactions*, he quotes a number of cases that he operated upon without opening the sac, and compares the mortality in these with that in the cases in which he did open the sac, and shows the former to be considerably the most favourable. But it must be remembered that he by choice would always have performed the first operation, and that he only performed the second (in which the sac is opened) in those cases which, from the length of time they had been strangulated, or other symptoms, indicated a dangerous state of intestine, or in which he was unable to return the bowel without opening the sac; and by his own admission, the danger to the patient is in proportion to the time of strangulation; from which it is evident that he performed the first operation in the favourable cases, and the second in the dangerous ones; which is quite sufficient to account for the difference of mortality, and to render the comparison utterly fallacious. It is not, of course, meant that Mr. Luke had overlooked this, or wished it to be understood that the cases were fairly comparable for the deduction of the relative mortality of the two operations; but that other supporters of the operation have quoted these statistics for that purpose, as, *e. g.* Mr. Erichsen,‡ who brings forward Mr. Luke's comparison of cases as an overwhelming answer

* This is admitted by Mr. Aston Key, one of the principal advocates of Petit's operation. See also Mr. Hutchinson in *London Hospital Reports*, vol. ii. p. 113.

† Operative Surgery, p. 576.

‡ Science and Art of Surgery, 3d edition, p. 916.

to all objections. A far more just estimate of the mortality of the two operations may be formed by comparing the average mortality of operations for hernia at a hospital where the sac is, as a rule, opened, with that of a hospital where it is, as a rule, not opened. This has been done in a paper by Mr. T. Holmes and Mr. G. F. Cooper, in the *Medical Times* of 1861, where a comparison is made between the operations at this and at the London Hospital; and where it is shown that the mortality is rather less (30·5 per cent) at this hospital, where the sac was opened in all but 4 out of 121 cases, than it is at the London Hospital (33 per cent), where more than half the cases were operated on without opening the sac.* It is evident, then, that the incision of the sac does not increase the mortality of the operation for strangulated hernia; and the foregoing remarks demonstrate, I think, that the advantages of the operation in which the sac is opened are certainly greater than those which pertain to that in which this structure is not incised, viz.:

(a) That the condition of the intestine can be accurately determined, and that there is therefore less danger of returning a gangrenous intestine.

(b) That it insures the detection of constriction of the bowel by adhesions, omentum, or thickening of the sac.

(c) That the fluid in the sac escapes externally, instead of being pressed into the abdomen.

(d) That there is less danger of wounding the intestine.

(f) That it is less fatal.

The treatment of the patient after the operation is another matter on which the most opposite opinions prevail; one class of surgeons exciting the bowels to action as soon as possible by purgatives, another class endeavouring to keep the bowels quiet, and to prevent their action for at least several days. Of the first method Mr. Lawrence may be taken as the exponent. He recommends colocynth and calomel, followed by sulphate of magnesia, to be given until copious motions have been obtained; and gives it as his opinion that this treatment does not aggravate, but is calculated to lessen, inflammatory action in the stomach and bowels.† The ma-

* See also an analysis of Gay's cases, by Mr. Hancock, op. cit. p. 49.

† On Rupture, p. 323.

jority of surgeons, however, adopt a treatment directly the reverse of that advised by Mr. Lawrence, and it seems to me with reason ; for there at once arises the objection (a powerful one), that the system he recommends is entirely opposed to the indication of nature. The first thing that occurs when the bowel is injured is, that its action is stopped, and that if left alone, it keeps quiet until it is sufficiently recovered to do its work again with safety. I cannot, therefore, but think that it is highly injudicious to excite it to action by purgatives ; besides which, increased action in a part causes increased determination of blood to that part, which surely is hardly what is required in an already highly-congested and inflamed portion of bowel. It is the practice, then, at this hospital, to favour the quiescence of the injured intestine, and for that reason to give opium in full doses after the operation ; and so far from exciting the action of the bowels by purgatives, to give them perfect rest, even for seven or eight days,* at the end of which time they will probably act spontaneously, and may then be assisted by an enema ; the diet also is as simple and unirritating as possible.

Important as is the subject of strangulated hernia, the surgery of the reducible variety is scarcely less so ; and this will be the more evident if it is considered how great is the number of persons that are the subjects of this condition (according to Malgaigne, one man in every thirteen, and one woman in every fifty-two), and that each of these is liable to strangulation of the bowel and the consequent imminent danger to life. But the only point in connection with this, upon which there is much difference of opinion, is the desirability of attempting a radical cure. I think it must be admitted that in the upper classes the cases are few in which, with our present knowledge, this can be recommended, as there is no doubt that, with a well-fitting truss constantly applied, and another at hand if required, a person engaged in no very laborious occupation is in tolerable safety. But with the lower ranks of life the case is different ; and I do not doubt that in them there are many cases in which it would be desirable to attempt to effect a radical cure ; for even if the truss were always well-fitting, and it often is

* See Hilton's Lect. on Rest and Pain, p. 56, &c.

not,—and if it were worn night and day, which it scarcely ever is, there is at all times the danger, in those whose employment necessitates much physical exertion, of its temporary displacement and the consequent protrusion of the bowel; but the fact is, that as it is generally relinquished when the patient is resting, and is often liable to be left off in consequence of being broken, or some other accident, the hernia frequently takes place, and may become strangulated, after the patient has worn a truss for years. Thus, of 181 cases operated on in St. George's Hospital, the average time that a truss had been worn was, in the congenital cases twenty years, and in the non-congenital cases twelve years.

It seems to me, therefore, that it would be a great advantage if even a moderate proportion of those among the lower classes affected with hernia could be rendered independent of the aid of a truss, if this could be done without any great risk. There are also some cases in which, from the tenderness of the skin, the pressure of a truss is extremely painful and irksome, and others in which, from the large size of the hernia, no truss can be efficiently applied. For these also a radical cure would be very desirable.

From very early times various methods have been proposed and adopted for effecting this, some of them more extraordinary than rational, such as excision of the sac and testis, the introduction of isinglass, blood, and gold-beater's skin into the sac, the injection of iodine, application of caustic, &c.; but the only operations which seem worthy of any attention, or which have been at all extensively tried, are those invented respectively by Prof. Wutzer of Bonn, and Mr. J. Wood of King's College, both of which are for inguinal hernia, and have for their object the closure of the inguinal canal. Of these, there can be no question of the superiority of Mr. Wood's,* which seems to have been attended with sufficient success to warrant a more extended trial in such cases as I have alluded to above.

* For a description of the operation and its results, see Wood on Rupture; also Redfern Davies, in *Dublin Quarterly Journal* for 1862, vol. xxxiii.

X. ON AMPUTATION AT THE HIP-JOINT,

AND ON THE APPLICABILITY OF THIS OPERATION IN SOME OF THE
WORST CASES OF MORBUS COXARIUS.

PART I.

FOR RECURRENT FIBRO-PLASTIC TUMOUR.

THE operation of removing the thigh at the hip-joint is one which it is fortunately not often necessary to practise in the surgery of civil life;* and the great mortality of which, when practised as a primary operation in gunshot injuries, has led to its very general disuse in military surgery. The mortality of this operation is said in some books to be about one half. It appears, however, to me, that all such so-called statistical enumerations of the percentage of deaths after operations are very nearly useless in practice, on account of the great difficulty of classifying the cases so as to bear a fair comparison with each other. Thus, in amputation,—when the cases are all lumped together, primary for injury, secondary for injury, for acute disease, for chronic disease and for deformity,—every one must see that they have little analogy with each other, being instances of affections of the most diverse nature

* The last case in which the thigh was amputated at the hip-joint in this Hospital, previous to the first of the cases here related, occurred in 1855, in a patient, æt. 17, under the care of Mr. Tatum, suffering from malignant (osteoid) disease of the femur. The lad rapidly recovered from the operation, and left the hospital in four weeks; but the disease recurred in the lungs, and he died about half a year afterwards. Preparations from this case are to be found in the museum, Ser. II. 240 (the thigh-bone and tumour removed by amputation), and Ser. VII. 31 (the tumour recurring in the lungs).

occurring in patients whose previous health and condition, and therefore their present expectation of life, differed incalculably; and these affections having only one thing in common, viz. that amputation was one of the means resorted to for their treatment. It is a fact which ought never to be forgotten, that most surgical operations, and especially amputations, are only portions of the treatment of the case in hand, and that the result is usually influenced, and often almost entirely caused, by other and independent agencies. This is most evident in primary amputations for extensive injuries, where a fatal result is often produced by lesions which affect other parts of the body, and still more often by the previous influence on the patient of the extent of the injury for which amputation is afterwards performed. This fact, which is so conspicuous in primary amputation for injury, is also of great importance in secondary amputation for injury, and must have very great influence on the percentage of recoveries after amputations of all kinds, and especially on those in which the most variable conditions are roughly classed together as "pathological amputations for acute disease." In a great many of the latter the patient is in a condition of surgical fever which differs little, if at all, from pyæmia. In many pyæmia actually exists, as in the second of my cases of amputation at the hip-joint, after excision of the hip, related below. And yet death in all these cases, though inevitable before amputation, is reckoned as a consequence of the operation, and goes to swell what is called "its" mortality. A similar method of reasoning might be applied to what takes place after the operation. How are we to know what percentage of deaths after amputation is due to causes which, though indeed connected with the operation, are not among its necessary consequences, such as injudicious treatment, negligent or foul dressing, unhealthy atmosphere, and a host of similar miscellaneous but most important influences? It must be clear that statistics in which the effect of such all-important matters is studiously ignored can have little real value in determining what is nevertheless for the surgeon a very weighty question, viz. what is the danger of an amputation *per se*; i. e. as a mere surgical injury. It is possible that if we got rid of the present imbecile method miscalled sta-

tistical, and could collect accurate notes of numerous uncomplicated cases, we might approach towards a satisfactory judgment on this matter. Meanwhile we must be content with the obvious fact that all amputations are dangerous injuries; and the amputation at the hip-joint so very much so, that it ought never to be resorted to unless there is no other chance of life. To what is this extreme danger due? We may allow hypothetically that the cutting away of so large a portion of the body may of itself, in some unexplained manner, produce a shock to the nervous system dangerous to life; or the same effect may, with more reason, be ascribed to the enormous size of the necessary wound. Some are inclined to attribute a prejudicial influence to the laying open so large a joint as the hip, and other causes may perhaps be imagined; but no one, I should think, would deny that the main danger of the operation depends upon the loss of blood which occurs at the time, and which, before the introduction of the aortic tourniquet, was inevitably so great that even the most trifling secondary hæmorrhage proved almost of necessity fatal. This danger has been materially lessened by Mr. Lister's tourniquet; and we have every reason to hope that the operation may prove for the future far less fatal than it has been in the past—at any rate in civil practice, for in actual warfare the tourniquet could perhaps hardly be used. The instrument, however, is not without its drawbacks, nor is it always easy of application; unless it is very accurately adjusted and securely screwed down, the artery is apt to escape from its grasp; while if the necessary pressure is used so as to keep the pad securely in its position, the descent of the diaphragm is somewhat impeded, and respiration becomes embarrassed, while the pressure which is exerted upon the viscera, and perhaps on the sympathetic nerves or ganglia, may be the cause of the alarming symptoms which are sometimes witnessed. Thus, in the last of the cases detailed below, in which the artery was commanded by manual pressure, a degree of syncope followed the operation which nearly proved fatal, the patient being a very feeble little child. This could not have been the result of hæmorrhage, since hardly a drop of blood was lost; and that it was the effect of the pressure is rendered the more probable by the observations of my friend

Mr. Marsh (late House-surgeon to the Hospital for Children), who found that on submitting healthy children to the manual pressure necessary to stop the circulation through the abdominal aorta, a condition of syncope was occasionally produced. If this is the effect of manual pressure, the more forcible and less limited pressure of an instrument will be still more likely to produce the same, or even more serious symptoms. But still there can be no doubt that the use of Lister's aortic tourniquet renders amputation at the hip-joint less formidable and less fatal, and will tend, therefore, to bring the operation into more common use.

Such will be also the effect of the doctrines which now appear to prevail with respect to the question brought so prominently before the surgical profession by Mr. Abernethy, viz. "the Constitutional Origin of Local Diseases." There is a strong tendency at the present day to review the doctrines of our ancestors both with respect to cancerous and to strumous diseases. Mr. Moore, of the Middlesex Hospital, has published a careful and well-reasoned pamphlet on Cancer, in which he gives many powerful reasons for believing that cancer commences as a local affection, and is diffused over the body by local contamination from the original tumour, and that therefore it is at first eradicable, if only the whole cancer be eradicated. The same is most likely the case in those semi-malignant tumours to which the names of "recurrent-fibroid," "fibro-plastic," "locally-malignant disease," &c. have been given. In such cases the constant recurrence of the disease in the neighbourhood of the scar of previous operations, together with the complete immunity of the patient from general disease (in fact, he is generally in unusually good health), render it in the highest degree probable that the cause of the renewed growth is to be found in germs, or invisible portions of morbid tissue, which have been left scattered about the seat of operation, and that if the operation had been practised so as to remove a considerable part of the healthy body besides all the tissues affected with disease, the patient would have been secure against any return of the tumour. For example, in a recurrent tumour confined to the calf of the leg, immunity from recurrence would be secured by amputating through the centre of the thigh.

Whether this would be so or not, time and much-extended experience can alone enable us to determine. The ensuing case, however, may have its value as a contribution to the history of tumours of this nature. It is true that this single case can hardly do much towards settling the important question indicated above. Yet it is not without its bearing upon that question. The tumour was clearly of the nature indicated by the word "recurrent." It had been removed once (by Mr. Tatum) completely, as far as could be judged, and had, on examination, been pronounced by Dr. Dickinson to be "recurrent-fibroid." The opinion was promptly verified by the recurrence of the tumour. The renewed growth which followed on the attempt made by me to remove the tumour does not prove any thing as to its nature, since that attempt was confessedly unsuccessful, and portions of the growth were left behind. But the progress of the tumour afterwards was exactly that of these locally-malignant diseases—fungating out of the wound, and draining the strength of the patient by ulceration and repeated hæmorrhage, without any constitutional affection. I have no hesitation, therefore, in adducing this case as an example of recurrent tumour; and now the importance of the question indicated above comes fully before us. If it be believed that the tumours recur in consequence of some mysterious predisposition of the whole system to produce such growths, and that if one part of the body be cut off, another will be chosen as the nidus of the disease, it would be useless to torture the patient with a formidable operation, from which no good result was even hoped. But if, on the contrary, the disease recurs because its elements are left behind in the tissues, it might be possible, by amputating as high as possible, to get beyond the tissues so affected. Both views were practically represented by those who met in consultation about the case before us; but as I was unacquainted with any case in which it could clearly be proved that a recurrent tumour had appeared after the whole limb containing it had been removed, I determined to give this patient at any rate a last chance for her life, and was supported in this determination by several of my colleagues. The result must, I think, be held to have justified the course

adopted. In this patient the tumour had spread so high that I was somewhat apprehensive that I might not be able to amputate through healthy tissues. This was my reason for forming the flap to cover the acetabulum as much as possible from the skin of the front of the thigh, which was unaffected, and for avoiding the muscles and indeed all the tissues of the back of the thigh, which were extensively infiltrated with the disease. This reason explains the somewhat unusual method that was adopted in the amputation—a method, however, which gave so abundant and well-formed a stump, that I should be disposed to follow it in any future case.

CASE.—Ann Allen, æt. 35, servant. Admitted Dec. 14, 1864, under the care of Mr. Tatum.

History.—For the last six years she has not enjoyed good health; has felt low and weak, but has not presented any definite symptoms until *six weeks* ago, when she began to suffer from pain in the bottom of the back and down the left thigh. Three weeks ago, whilst kneeling, she felt “something crack in the thigh;” this drew her attention to the part, and she noticed a very small tumour in the back of the thigh; she then began to suffer very great throbbing pain, “as if something were gnawing the bone.” The tumour increased slowly till five days ago, when it suddenly became bigger, and the pain ceased. She has lost flesh very considerably during the last few weeks. There is no hereditary history of cancer, and she cannot attribute her disease to any thing.

On admission.—There is a large distinctly-circumscribed tumour on the inner surface of the left thigh, about its centre; it is firm and hard, but elastic, and not lobulated: when the thigh is extended, the tumour cannot be moved; but on flexing the thigh to relax the muscles, it can be freely moved both on the bone and subjacent parts. No neck or pedicle can be felt to it, though the thigh is wasted. The superficial veins over it are not enlarged, and none of the lymphatic glands in the neighbourhood are enlarged. There is pain on making pressure in the iliac region, but the finger can be well buried in the iliac fossa; and there is no matting of the tissues in this situation; no pain on percussing the spine.

January 5th, 1865.—The tumour was removed by a single longitudinal incision; it was contained in a distinct capsule, and presented all the characters—both to the naked eye and under the microscope—of recurrent fibroid disease; the oat-shaped nuclei being especially well marked. The wound united rapidly after the operation, and she was discharged February 18th.

June 7th, 1865.—The tumour had commenced to return about two months after its removal, and at the above date she was admitted again into the hospital.

It became now a serious question what course ought to be pursued. The tumour was larger and more complicated in its relations than on the previous occasion ; it was also more firmly attached. It extended from about two inches below the tuberosity of the ischium into the upper part of the popliteal space, and lapped round the femur, raising the adductor magnus muscle on its inner side. She complained also of pain and tingling sensations down the course of the sciatic nerve, showing that the latter was at least compressed, if not involved in the tumour. The mobility of the tumour was but slight ; still it was sufficient to render it improbable that there was any direct connection with the bone, especially considering the nature of the previous growth.

At a consultation the three courses were debated : (1) to attempt to remove the tumour a second time ; (2) to amputate the limb at or near the hip-joint ; (3) to abandon the patient to her fate. The last seemed inhuman and unjustifiable, considering her good general health, and the doubt that must always exist in such cases whether the tumour recurs in consequence of some innate tendency or in consequence of some small (possibly invisible) portion left behind. As against the simple removal of the tumour there were the powerful considerations that it had been to all appearance completely removed before, yet with only a brief respite from the disease, and that it now had spread so extensively that it would be very difficult and highly dangerous to attempt its removal, while the boundaries of the tumour were so indistinct that it did not seem at all clear that it could be circumscribed by dissection.

Still the risks of an amputation at or close to the hip seemed too great to encounter in a case where the prospect of lasting benefit was so slight ; and it was accordingly resolved to attempt the excision of the tumour.

Mr. Tatum had been in charge of the case up to this time, but he was now accidentally obliged to be absent from the hospital for some weeks, and the patient fell under my care.

In accordance with the course which had been decided on, I attempted to remove the tumour on June 27th. A long incision was made down the back of the thigh, beginning a little below the tuber ischii, and ending in the popliteal space. This was crossed by another running inwards from its centre, and thus two large flaps were dissected off the tumour. It was found hardly possible to define correctly the separation between the mass of the tumour and the healthy parts, since the new growth was not circumscribed by any capsule, but the whole cellular tissue in its neighbourhood was loaded with soft whitish substance, resembling the structure of the tumour. It was necessary to go deeply at the upper part, in order to get round the upper end of the tumour ; and here one of the muscles (the biceps femoris) was found so deeply infiltrated with the morbid material, that it was determined to remove the whole mass of it, which was

done for about four inches. The sciatic nerve now came into view, and was at first believed to be infiltrated with the growth. On more accurate dissection, however, it appeared that though the tumour adhered closely to the sheath of the nerve, it was separable from the latter, and thus the nerve was exposed for about five inches. The tumour having been thus freed from its main connections, there was no difficulty in getting round its outer side and turning it out of the popliteal space; but on attempting to define its inner edge, it was found impossible to do so. The growth was followed round to the inside of the thigh, but there it became so mixed up with the cellular tissue, muscles, and fasciæ of the part, that the attempt to reach perfectly healthy tissues was necessarily abandoned. The patient, in fact, was too much exhausted by the protracted operation to bear much more; although, in proportion to the magnitude of the incisions, not much blood had been lost. On sponging out the wound and examining it, there was no substantial part of the tumour to be seen, but the floor of the wound had a suspicious grayish look at the inner part. A quantity of "blue lint"* was stuffed into this part of the cavity, the nerve having been defended from the action of the caustic by ensheathing it in lint steeped in oil.

The symptoms after this severe operation were at first rather alarming—constant vomiting, much prostration, great pain in the wound and down the course of the nerve; but her excellent general health enabled her soon to rally. A good deal of slough separated from the cavity, the pain down the course of the sciatic nerve was much assuaged by the local application of belladonna, and the wound began rapidly to contract.

On July 23d the favourable progress of the case was interrupted by a severe attack of secondary hæmorrhage. This was the more unexpected, as the sloughing excited by the blue lint had long since ceased, and there did not appear the least trace of any unhealthy ulceration in the wound. The bleeding was arterial, and easily controlled by pressure on the femoral. It came from two vessels at the bottom of the cavity on the inner side. The bleeding points were at a considerable distance from each other. After two or three recurrences of the bleeding, a consultation was held, and it was decided to amputate the limb, should the bleeding recur. It ceased, however, for the time, and the wound continued to close. She now again passed under Mr. Tatum's care. In the month of August the renewed growth, which had been foreseen as almost inevitable, made its appearance in the form of a fungous tumour, sprouting out of the wound and infiltrating the soft parts and the skin in the neighbourhood. The sprouting parts sloughed and occasionally bled, and she suffered much from pain down the course of the nerve. In the month of September I was again placed in charge of

* That is, lint impregnated with a saturated solution of sulphate of copper.

Mr. Tatum's patients during his temporary absence, and the poor woman thus came again under my notice. She was now in a very miserable condition, and evidently near her end. The tumour was about the size of a cocoa-nut, and large masses of it were sprouting out of the unhealed portion of the wound, giving rise to a copious foul discharge, with occasional (though not profuse) hæmorrhage. The tumour spread upwards, below the adductor muscles on the inside, to within two inches of the groin. The pain down the course of the nerve prevented her from obtaining any natural rest, and she was much emaciated and gradually sinking.

It was evident that the patient's condition could not be made worse by any measure that could be adopted. On the other hand, it seemed quite possible that she might survive the amputation, if it could be managed without much loss of blood; and then there was a possibility, however faint, that the tumour might not recur. The same doubt, to my mind, still hung over the original question—viz. whether the tumour recurred because of some inherent property in itself, or because some imperceptible particle of it had been left behind at the first operation. The result of the second operation proved nothing, inasmuch as it was almost certain that some part of it (and probably a good deal) had been left behind; and I confidently predicted at the time that it would soon sprout again.

Allowing, then, that amputation was justifiable, and ought to be recommended, ought it to be performed at or below the hip-joint? As the tumour extended so high, and as no flap could be taken behind, it would in any case have been necessary to divide the femur close to its upper end, *i. e.* through the trochanter. This would have protracted the operation, and involved more risk of hæmorrhage, and I could not see any corresponding advantage; so it was decided to amputate at the hip-joint. The patient gave her consent willingly, and the operation was performed on September 14th. Lister's tourniquet was applied to the abdominal aorta; but the patient was so emaciated, that the tourniquet could not be screwed quite far enough down to control the artery entirely. Still the instrument rendered essential service by checking, if it did not entirely stop, the stream of blood. The anterior flap was formed almost entirely of skin, of elliptical form, about six inches long, having its base from the point midway between the trochanter and spine of the ilium to the middle of the fold of the perinæum. The muscles and other parts below the fascia were divided about two inches below Poupart's ligament; and thus the lobes of the tumour projecting on the inner side of the thigh were completely avoided. The joint having been cut through, the knife was brought out through the buttock, almost directly backwards, very little or no flap being taken posteriorly, so as to avoid all contact with the site of the previous operations. Sixteen ligatures were applied. Considering the nature of the operation, very little blood was lost. She was, however, extremely prostrated by the shock of the operation, and it was only

by the most sedulous care on the part of myself and my house-surgeon, Mr. Barker, that she was kept alive through the day and night. She was kept partly under the influence of morphia by means of repeated hypodermic injections; small quantities of burnt brandy and ice were given; and she was nourished by beef-tea injections into the rectum every four hours. The sickness from the chloroform continued most distressing, and prevented her from taking any nourishment till the following evening. Then, on the third day after the operation, a slight attack of diarrhoea (very probably provoked by the long use of the nutrient enemata) set in, and very nearly proved fatal. But she weathered all these dangers, and the wound then began rapidly to unite. No dressing whatever was applied to it, except a piece of wet lint. Eleven days after the operation, the upper and outer part of the wound having united firmly, I withdrew the silver sutures from this part of the stump, and on the thirteenth day all the rest. Eight of the ligatures were withdrawn on the seventh day; all the others, except that on the femoral artery, on the eleventh, and the latter on the sixteenth day. She was able to leave her bed on October 2d, eighteen days after the operation, the stump having almost healed, and a small bed-sore which had formed over the coccyx having also healed.

On examining the limb after amputation, there was found a large diffused mass, closely adherent to the upper two-thirds of the linea aspera of the femur, infiltrating all the tissues at the back of the thigh, and presenting a foul ulcerated surface on its superficial aspect, where it projected through the wound of the previous operation. It extended from close below the trochanter to the upper border of the popliteal space. On making a section of the thigh, its various tissues could hardly be recognised, being converted into a homogeneous yellowish mass of tolerably firm consistence, in which the sciatic nerve was found embedded. Under the microscope, many round and oval cells were found, and some spindle-shaped nuclei.

She left the hospital on October 24th, to stay at a charitable institution in Brompton, the stump having very nearly healed. Still, however, she complained greatly of pain and throbbing in the stump, for which there seemed no good reason; till one day, more than two months after the operation, a ligature which had accidentally got buried in the stump came out, and then the sinuses healed rapidly, and the pain subsided. After she had lost the pain in the stump, pain came on in various parts of the body, and especially at the nape of the neck, so acute and persistent, that there was at one time a suspicion of disease of bone in that situation. But an attentive examination showed that there was really no evidence of this, and the pain subsided shortly after her re-admission into the hospital in January 1866.

All went well; the stump appeared quite sound; and she was able to get about a little on crutches, when unfortunately she got a slight fall while walking. Whether this had inflicted any injury on the

stump, I cannot say. In February Mr. Gumpel constructed for her an artificial limb, with which he believed she would be able to walk; when, on the very day that the instrument came home, the scar of the operation gave way in one place, and a copious discharge of pus took place. A probe passed into the situation of the acetabulum, and the bone itself appeared exposed. This abscess, however, rapidly and soundly healed. This promising state of things was unfortunately only transient. In the month of March her condition altered visibly for the worse. She began to complain of cough, with hectic fever at night, and severe colliquative perspirations, for which she was put under Dr. Page's care. Soon the presence of a tumour in the right side of the abdomen, apparently in contact with the liver, gave unequivocal evidence of the recurrence of the original disease. The old pain at the nape of the neck recurred, and she began rapidly to sink. Before her death the left arm became almost wholly paralysed, so that though she could move her fingers, she could not lift her arm from the shoulder. At the same time also a lump showed itself between her shoulders. All this time the stump appeared quite healthy; a small enlarged gland, which had become perceptible while the abscess was forming in the stump, having again rapidly subsided.

Post-mortem examination showed the tissues of the stump quite healthy, the cicatrix sound and linear, the glands returned pretty nearly to their natural size, and all the soft parts which closed up the acetabulum of their natural colour and consistence; the bones were quite sound. In the interior of the pelvis, however, there was a large globular tumour about the size of a good-sized orange, closely adherent to the bone forming the inner wall of the acetabulum. The bone here felt a little soft below the tumour. There were masses also adherent to the left side of the lumbar vertebræ, and the cartilage between the fourth and fifth appeared in part infiltrated by the disease. The chief tumour, which had been felt during life on the right side of the abdomen, was, as had been conjectured, in connection with the liver. It grew and fungated out of the lower surface of that viscus, and penetrated, though to no great depth, into its substance. Both lungs contained masses of the disease, some in the substance, others on the edges of the lungs. Those on the pleural surface were hardened, as though compressed by the movements of the lungs against the chest-walls. One of the ribs was partially eaten away by a deposit of the same tissue, so as to give way when handled. Finally, one or two small spots of the same deposit were found in one kidney.

On section, most of the tumours resembled the original disease, being of a creamy colour, soft consistence, destitute of any juice, and in outward appearance much resembling adipose tissue. On microscopic examination they showed abundance of nuclei and small fibre-cells, but no cancer-juice, or any other of the elements of malignant tumours.

This applies to all the other tumours, except the one in the pelvis.

This tumour differed materially in external appearance from the rest, being very soft in texture, shot with various colours, in consequence of its containing more or less blood mixed throughout its substance, and permeated with a creamy juice, which adhered in large quantities to the knife with which the section was made.

On microscopic examination of the juice it was found to consist almost entirely of large round cells, much resembling pus-globules, most of them containing two nucleoli, and in some with faint indications of a membrane around them. A few, but very few, small fibre-cells were also seen.

A report on this case will be found in the current volume (xvii.) of the *Transactions of the Pathological Society*, in which the reporters express their opinion that this was a real instance of fibro-plastic, and not of cancerous, tumour. It seems to me to afford a rare and very interesting example of a feature not hitherto noticed in such tumours, and which brings them still nearer to those which are really cancerous, viz. that they may even recur in internal organs and parts of the body while the wound of the operation remains healthy.

PART II.

IN MORBUS COXARIUS.

The necessity of amputation at the hip-joint in a case like the above, where life is threatened by the rapid growth and the ulceration of a large tumour, which cannot otherwise be got rid of, will be questioned by no one, though it is unfortunately very rarely that permanent success is achieved; for in most of these cases, however favourably the patient may recover from the immediate effects of the operation, return of the disease may be expected, and at an early period. My present object will be to dwell shortly upon another class of cases where I contend that the operation may in some instances be legitimately employed. I mean cases of extensive disease of the hip-joint. The amputation may be performed primarily, *i.e.* before any less-extensive measure has been tried—or secondarily, after partial or complete excision of the diseased joint.

In making such a proposal as this, two obvious objections meet us; viz. (1) that disease of the hip-joint is usually only a symptom of general strumous affection, and that it is useless

to take away the local disease only to leave the patient to perish by the constitutional affection; and (2) that disease of the hip cannot be regarded as analogous to affections of other more accessible joints, since the pelvis may be diseased to such an extent as to preclude the removal of the diseased parts, whereas in amputations of other joints it is possible to get above the disease, and to perform the amputation through healthy parts.

To the first objection I shall not think it necessary to give very much answer. If it were valid, it would equally preclude the propriety of any operation such as excision, and would in fact preclude the possibility of natural recovery. I need not here discuss the general question of the nature of these chronic (so-called strumous) diseases of the joints. It will be sufficient in this place to say, that as in other joints, so in the hip, such chronic affections appear often to be purely local, called forth by local causes, subsiding under local measures, and leaving the patient quite healthy after complete removal. They are, however, very liable to be followed by hectic and tubercular consumption, if allowed to run on to prolonged suppuration. If then we can diagnose the cases in which the disease is locally incurable, and yet uncomplicated by any constitutional affection, it seems justifiable to undertake any operation which the patient's strength can bear, in order to its complete removal. But, secondly, can the disease, when extensive, be completely removed by amputation? I have no hesitation in saying that it may. Disease of the hip-joint does not, except in very rare cases, affect any other part of the pelvis besides the acetabulum. The cases in which the spine, or the pelvis in the neighbourhood of the spine, is affected at the same time as the hip, are marked by their own symptoms, and such cases should be separated, and of course rejected as beyond the reach of operation. But if the disease be limited to the acetabulum, the whole acetabulum is fully exposed by the amputation, and can be removed by the gouge or chisel, or even the trephine, until the whole floor of the cavity has been taken away. This is generally all the more easy, as, in such advanced cases, a great part of the floor of the acetabulum has usually perished, and comes away entire in the form of one or more sequestra. No harm need be apprehended from the removal of the bone and

the consequent laying-open of what is generally, though not correctly, called the pelvis. In fact, it is not the pelvis, in the true sense of the term, which is laid open by the removal of the wall of the acetabulum—*i. e.* it is not the cavity in which the viscera and the large vessels are contained, but the space between the bone and the pelvic fascia, while those viscera and vessels are lodged inside the fascia. If any demonstration were wanted of so plain a fact, I would state that I have often, in desperate cases of hip-disease, removed enough of the acetabulum to pass one or even two fingers through the bone, and this in a child involves the removal of pretty nearly the whole articular portion. In such cases recovery has occurred. I may mention one lad, who is now walking about actively on the limb which was operated on, in whom I believe the whole acetabulum was taken away. If in such an operation the surgeon will pass one forefinger through the acetabulum, and place the other in the rectum, he will feel that he is indeed in the pelvic cavity in one sense, since there is no bone between his two fingers; but he will also feel a firm floor of fascia beneath the wound in the acetabulum, which protects the viscera and other contents of the pelvis from any of the sequelæ of the operation as effectually as the bony wall would do.

This proceeding is, of course, far more easy after amputation, where the bone is completely exposed, than in excision, where it lies at a great depth and is quite invisible, so that its condition can only be judged of by the touch. This constitutes one of the great difficulties of the excision of the hip, and one of the causes of its frequent failure. After amputation, on the contrary, there is no reason why every portion of exposed and softened bone should not be dealt with just as the surgeon pleases.

The severity of the proceeding in childhood is not so great as might be imagined from the analogy of amputation at the hip in the adult. In children the abdominal aorta can generally be easily commanded by the pressure of the thumb for the little time required to perform the amputation and tie the vessels; or if the patient be too large for this (as in Mr. Lee's case, to be presently related), a Lister's tourniquet will accomplish the same purpose with certainty. In none

of the three cases to be found below was there any more hæmorrhage (in fact, I think less) than in an ordinary amputation of the thigh. In the third, indeed, alarming collapse followed; but the child was almost in a dying state when the operation was undertaken. Therefore, if the patient has any vital power, the operator need not be apprehensive about his being able to complete the necessary operation without unduly prolonged anæsthesia or alarming hæmorrhage.

The operation may be either primary or secondary. In the first case, excision of the hip is contra-indicated by disease extending down the femur; in the second, excision has been performed, and the femur has been afterwards attacked with chronic or acute osteo-myelitis.

It so happens that the three cases detailed below will illustrate each of these three conditions.

The first was a boy under Mr. Lee's care; and I am indebted to Mr. Lee for permission to use Mr. Pick's notes of the case, and for the drawings which illustrate it.

CASE I.—Charles Barnes, æt. 14. Admitted July 19th, under the care of Mr. H. Lee.

History.—His mother stated that disease commenced in the hip when he was three years old, the result of a fall from a wall. Soon after the accident he complained of pain in the hip and knee. The complaint made slow progress at first, and very little attention was paid to it. After a time, however, the pain became very great, and he was then placed under treatment, kept quiet in bed, and a splint applied. He now seemed to recover, and was able to run about, though the joint was stiff and the limb shorter than the other. Two years ago he had a fresh attack of pain, followed by the formation of abscesses, which have been discharging ever since. Six months ago he was in St. Mary's Hospital, where "an operation was performed." The records of St. Mary's Hospital have been searched, and there are no notes in them of any operation having been performed. It is probable that the operation was merely that of opening an abscess.

On admission.—There was very considerable distortion of the body; the spine was twisted and likewise the pelvis, so that the thigh of the affected side crossed the other, and the knee rested on the bed external to the sound limb. The extremity was much wasted, and about two inches shorter than the sound one. There were numerous sinuses running in every direction around the hip, and extending into the joint, where exposed bone could be felt. There was very great pain

on motion, and considerable swelling, so that the exact position of the head of the bone could not be ascertained. There was fulness in front of the joint, extending up into the iliac fossa. He was of an extremely scrofulous diathesis. Ol. morrh. ʒjv. ; tinc. ferri mur. ℥xv. bis die ; ord. diet ; porter 1 pt.

August 6th.—Remains in much the same state. There is considerable discharge, and he is unable to straighten his thigh. Hst. quin. acid. ; vin. rubri ʒjv.

19th.—He was placed under chloroform, and an attempt made to straighten the hip : this could only partially be done. A long splint was applied.

26th.—There has been much more pain and more discharge since the splint was applied.

September 2d.—Still continues in very great pain ; he is losing flesh, and his pulse is very quick and feeble. There is still considerable discharge.

10th.—The pain is much less than it was, but the discharge still continues, and he does not gain strength.

24th.—He was again placed under chloroform, and the long splint reapplied. The hip was now got much straighter.

October 4th.—Seems much stronger and brighter. Pain less ; discharge less.

15th.—Still continues to gain strength, but there is a large tense swelling in the right iliac region, very painful on pressure. He has had the splint taken off, and a weight applied to the foot.

28th.—Does not seem so well. Tongue furred ; pulse very quick. There is less discharge, and the swelling in the iliac region has extended till it now nearly reaches the umbilicus. Quinæ disulph. gr. ij. ; acid. sulph. dil. ℥x. ; sp. æther. chlor. ℥x. ; hst. cinch. t. d. s.

November 10th.—Seems better again. The discharge is now profuse, and the swelling less tense than it was. There is more shortening, at least two inches. On introducing a probe, dead bone can be felt.

25th.—Since last note he has improved much in health. The discharge is less profuse, and the swelling extends midway between the pubes and umbilicus.

December 7th.—The aorta having been compressed by Lister's tourniquet, an incision was made about four inches in length over the great trochanter, with a view to excision : but as the disease was found to be too extensive, the lower end of the incision was joined by a circular one round the thigh, and the flaps dissected up. The thigh was then abducted, when the femur gave way just below the trochanters. The limb was then removed, and the head of the bone dissected out. There was a communication at the bottom of the acetabulum with the pelvis, large enough to admit the finger.

The femur was so soft that it broke down near its head in the necessary extension of the limb during the amputation ; so that the re-

mains of the upper end of the femur were left in the acetabular cavity, from which they were removed after the vessels had been secured. It could not be said that the head of the femur existed, as the bone terminated in quite an irregular extremity: yet this might as well have been the result of disease as of any operation. The appended drawing shows the femur diseased at both ends, but a good deal of the upper end has crumbled away in maceration. The acetabulum was also greatly softened; and by gouging and removing the crumbling fragments of dead bone from it, a hole was worked through it, by means of which a large abscess, which had formed in the pelvis, was opened, and a free discharge of matter procured. It is evident that this extent of disease quite precluded the idea of any less radical operation than the one adopted.

8th.—Has slept a little during the night. He has been sick once or twice. P. 104; tongue furred.

9th.—Stump puffy. Has been sick several times. T. furred; p. 88. The sutures were removed. Sodæ sulph. gr. xv.; sp. chloroform. ℥xij.; tinc. opii ℥x.; mist. camph. 4tis horis.

10th.—He seems very low and faint, and has great difficulty in breathing. P. 120; T. furred. There is considerable discharge of broken-down blood-clot, and the stump is offensive. Lot. sod. sulph. ʒj. ad vj.; sp. v. gall. ʒviiij.

11th.—Still very low and weak. P. 160; T. dry. Stump extremely foul and offensive.

12th.—He seems much better and brighter. Stump beginning to clean. P. 136; T. moist and creamy.

13th.—Wound cleaning and healthy. No pain. P. 144; T. clean; b. not open.

15th.—Stump quite clean. Appetite good. T. clean; p. 108, fuller.

18th.—Some of the ligatures have come away. The wound has been strapped.

22d. Very great discharge. Is sitting up in bed, and gaining strength every day.



26th.—Stump discharging freely. Gaining flesh, and feels quite strong.

30th.—Gaining flesh. Wound quiet; free and healthy discharge.

Jan. 6th.—Stump healing. Gains strength. He gets up every day.

13th.—The stump is very nearly healed. He is able to stand on the other leg.

17th.—Complains of great pain. An abscess is forming in connection with the stump. Great discharge from the stump. Ferri am. cit. gr. v.; sp. æther. chlor. ℥xv.; tinc. opii ℥x.; mist. camph. 4tis horis.

20th.—Stump discharging profusely. Pain much less.

27th.—Much less discharge. Stump all healed but two sinuses connected with the recent abscess. Is gaining flesh very fast.

Feb. 2d.—Has a bad attack of diarrhoea; otherwise is quite well.

7th.—Diarrhoea stopped. The two sinuses are discharging thin pus. There is a nice soft pad over the end of the bone. To go into the country.

Discharged.

The appended drawing represents the stump of the amputation.



This case shows that amputation may be resorted to as a primary operation in disease of the hip complicated with extensive affection of the femur and abscess in the pelvis. The following case, related briefly in the current volume (xvii.) of the *Pathological Society's Transactions*, illustrates

another contingency in which I believe the extreme measure of amputation may sometimes prove available to save life. I mean when, after excision of the hip, the femur has become the subject of chronic disease (osteo-myelitis), thereby causing constant pain to the patient with exhausting discharge, and destroying all hope of the ultimate usefulness of the limb.

CASE II.—The patient, Lewis Rossi, æt. 5, was admitted under my care at the Hospital for Sick Children, March 25, 1865. He had been a patient in the same hospital in the latter part of the previous year, and had thence been sent to Margate. The disease, however, was in no respect benefited. The position of the limb was very unnatural; the discharge constant though not very copious; and the condition of things hopeless without operation, though, it must be confessed, not very promising for an operation. The head and upper part of the femur was excised on April 22d. The acetabulum was not found exposed. The femur, where first divided, was found so soft and rotten, that a fresh section was made lower down; but here the bone was hardly in a much more healthy condition. The limb was straightened by means of a weight. Rigors occurred on the sixth day, with much constitutional depression, and the end of the femur became denuded, although it did not project from the wound. However, under stimulants and careful medical treatment, with good nursing, he recovered, and was going on very well, when on June 14th he vomited without any cause, and this was followed by four severe convulsive seizures. He soon rallied from this cerebral attack, and preserved no trace of it in the form of any paralysis or loss of mental power, or any symptom of meningitis. I find no mention in the notes of the case of any subsequent seizure, though I am inclined so think, from recollection, that he had another isolated attack of severe convulsions, much relieved by shaving the head and applying counter-irritation. All this time the stump of the trochanter was lying exposed at the bottom of the wound; and on July 5th I removed the dead portion of it ($1\frac{1}{2}$ in. in length) with my fingers. But still he did not improve. He had acute and almost constant pain in the limb, was constantly screaming, and his temper became extremely irritable. Abscesses formed in various parts of the limb, even as low as the popliteal space, and the bone was exposed, and felt soft as low as the situation of the epiphysis.

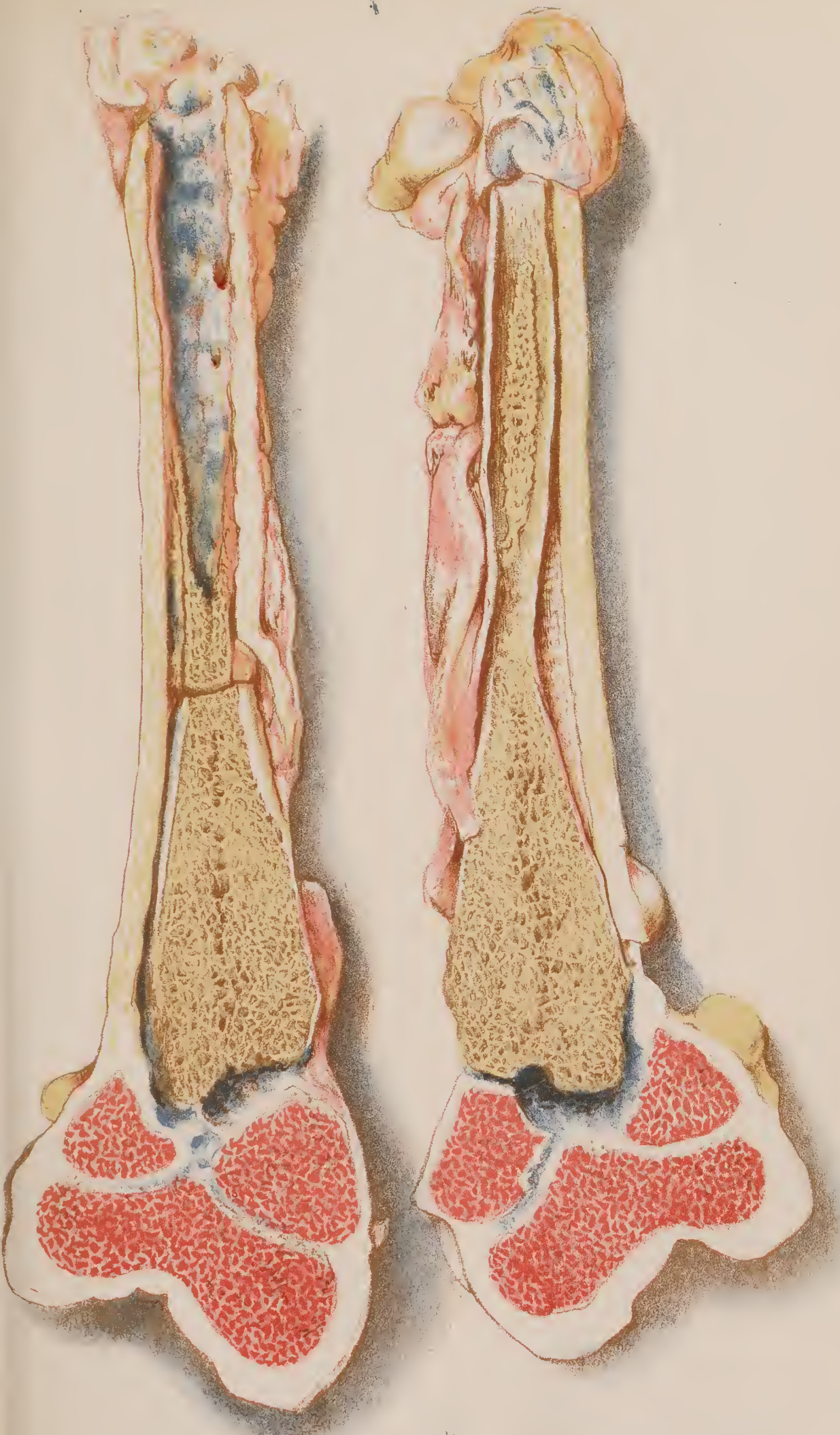
After much hesitation, on account of the cerebral symptoms, I determined to treat the case as though they might be caused by the mere irritation of the painful disease of the femur, which was at any rate possible. Accordingly, on September 6th, I amputated the limb at the hip. The end of the femur had become drawn up against the ilium, so that it was not easy to form the flaps by transfixion. The abdominal aorta being compressed by Mr. Marsh (late House-Surgeon to the Hospital), I cut the anterior flap from without, then divided the connections between the femur and pelvis, and formed the posterior

flap from within, in the usual manner. The tissues were much infiltrated, and there was some little difficulty in tying the smaller vessels; yet hardly a drop of blood was lost. After completing the amputation I scraped out the acetabulum, which was superficially ulcerated, removing about the whole of the surface, but not penetrating into the pelvis. The bone exposed seemed natural. The operation was in all respects completely successful; the boy lost all pain, and recovered cheerfulness. There were no fits of screaming or any other unpleasant symptoms. The stump healed kindly, and only a portion of the old wound remained still discharging when he was sent to Margate in the early part of October. There all went well for a little while, but then fits and other cerebral symptoms recurred; he soon passed into a state of coma, and died about the middle of November. The cause was found in two large abscesses, one of the brain, the other of the cerebellum, the former of which had penetrated the membranes and slightly eroded the skull. All the tissues of the stump were healthy; nearly all the gouged portion of the acetabulum had got covered in by the soft parts, and the rest was in a fair way of recovery.*

The third case in which I have seen amputation employed in the treatment of diseased hip was one also under my own care, in which I removed the limb on account of acute osteomyelitis of the femur following on excision of the hip, and being the first step in the process of pyæmic infection of the system. This case is also related shortly in the present volume of the *Pathological Society's Transactions*.

CASE III.—The patient, Harriet Burke, æt. 6, was under my care at the Hospital for Sick Children, on account of very advanced disease of the hip, implicating both the femur and the acetabulum. There were a considerable number of openings, none of them leading directly into the joint; but the crepitation on moving the joint showed that the bones were extensively diseased. A hard mass was felt above Poupart's ligament, which at first sight resembled a pelvic abscess, but as examination per rectum did not discover any thing in the pelvis, it was concluded that this mass was due to thickening around enlarged glands. As there was no prospect of natural recovery, and as the child was free from any history or symptoms of phthisis, I determined to remove the diseased parts, if possible. This was done on Jan. 6th. The diseased part of the femur was easily removed by a section through the trochanter. The acetabulum was then scraped away till the finger passed readily through it; and now, by placing a finger of the other hand in the rectum, it could be distinctly ascertained that the pelvis was free from abscess. The fascia beneath the acetabulum was firm and natural. There was a good deal of bleeding

* The accompanying illustration represents the femur in this case, and is appended as a good specimen of osteo-myelitis.



Femur removed from Lewis Rossz shewing the effects of Chronic Osteomyelitis

J Godart, Chromo Lith.

from a rather large vessel encircling the neck of the bone where it was sawn through, but this, though unusual in an excision of the hip, was by no means alarming; nor did the patient suffer any distinct symptoms from the bleeding. The limb was extended by means of a weight hung on to the foot; and she went on well till Jan. 11th, when the house-surgeon, Mr. Haward, noticed that the child looked pale and languid; the limb was œdematous, and the end of the femur became exposed in the wound—not protruding from it, but denuded by the recession of the periosteum and soft parts. On the following day she had a distinct rigor, vomited once, refused food, had a very rapid pulse, 136, and respiration, 30. The temperature was increased to 100.6° at $10\frac{1}{2}$ A.M., and 104° at $5\frac{1}{2}$ P.M. The tongue was aphthous, the face extremely distressed, and the body presented that peculiar saccharine odour sometimes noticed in pyæmia. The swelling of the limb was increased, but the knee-joint was not implicated.

If I had amputated on the previous day, as I was much disposed to do, I think it possible that this child's life might have been preserved; but she seemed very puny and feeble for such an extensive proceeding, and I was unacquainted with any precedent for it, so that I could not at once make up my mind. Next day, however, her condition was, if any thing, rather worse; and, seeing that death was otherwise inevitable, I determined to try what amputation would do. Mr. T. Smith was so kind as to assist me, and to command the aorta with his thumb. The operation was got through with the most trifling hæmorrhage (perhaps two or three ounces), but the child's pulse failed immediately after it, and for a long time it seemed as if she would die. Careful attention was required during the whole of the day and night to keep her alive with small and repeated doses of stimulants. However, she rallied, and was greatly relieved by the operation. She had no more rigors: the temperature came down to the healthy standard, and she was not sick any more. The discharge from the stump was healthy. It really seemed as if she had some chance for her life. But this favourable condition lasted only till Jan. 24th, when a little cough came on, and on the next day the whole exposed part of the chest presented abundant crackling, supposed at the time to be bronchitic. In her weak state this proved rapidly fatal. She died on Jan. 26th, the fourteenth day after amputation.

On examining the amputated limb, the periosteum was found to be separated from the femur as low as to the knee-joint, and there was pus between the bone and periosteum. The medullary cavity of the femur was loaded in all parts with pus.* There was slight excess of fluid in the knee.

Examination of the body showed the sole cause of death to have been pyæmic deposit in the lungs and pleura. In each apex there was a secondary deposit, softened and purulent; and in each pleura there was a layer of recent lymph, with purulent serum in the cavity.

* The bone was exhibited to the Pathological Society.

There seemed every reason to refer these pyæmic deposits to the same period, viz. the date of the rigor (the only one she had) which followed on the day after the first symptoms of inflammation of the femur.

I am not able to refer to any case exactly analogous to the first of these three. I mean one where morbus coxarius has been treated by amputation as a primary measure; although several are on record where that operation has been performed on account of extensive disease of the femur. Such are Mr. Curling's case, related in the *Path. Soc. Trans.* vol. xv. p. 186, and Mr. Godfray's case (which I had an opportunity of seeing two years ago when at Jersey), published in the *Lancet*, June 17, 1865, where will also be found references to two other similar cases besides Mr. Curling's.

I daresay many others might be added to these; but they differ from Mr. Lee's in the essential circumstance that the pelvis is unaffected. The result of that case appears to prove that such disease, though doubtless a serious, is not really an insuperable obstacle to the ultimate success of the amputation, and that in the amputation the operator can easily perforate the diseased acetabulum, and thus obtain an outlet for the pelvic abscess, in cases where such abscess exists. The importance of this latter consideration is exceedingly great; for the abscess can hardly obtain any effectual discharge otherwise. It is true that it may burst into the rectum; but this cannot take place till the fascia which forms the floor of the pelvis is perforated; which does not happen till much and probably irreparable mischief has been produced. Or the abscess may burst through the skin of the abdomen, or make its way out of the pelvis through the sacro-sciatic foramen, over the horizontal ramus of the pubes, &c.: but these can hardly be considered outlets, for a considerable collection of pus remains "pocketed" in the pelvis. Through the acetabulum, on the contrary, the outlet is depending, direct, and free, while the same process as opens an outlet for the pus which has been formed removes the diseased bone, which would furnish more. There is, I think, good reason to believe that some of the most complicated and otherwise hopeless cases of morbus coxarius may be saved by this treatment.

The second class of cases may also often be treated with success in the same way. Of this, indeed, two instances have

already been published: one successful, in the *Glasgow Medical Journal*, 1857;* and another fatal, in Heyfelder's work "on Excisions and Amputations." It must often have struck the surgeon when excising a joint, that the operation has probably been put off too long. The bone is softened; its periosteum peels off so readily that much care is necessary on the part of the assistant to avoid exposing it below the surface of the section; the compact wall appears thinned; and the cancellous tissue confused, crumbling, and filled with a somewhat purulent-looking marrow. Such was the case in the operation performed on Rossi; and so I have known it to be in many other operations on strumous or debilitated children.

Now, in cases presenting such clear evidence of disease at the seat of operation, is it wonderful that the disease should spread in many instances, and consecutive amputation become advisable? If this is the case in other joints, it may be expected especially in the hip, where the disease is always allowed to go on much longer before operation than in any other joint. In such instances I think the proper course is to amputate the limb, if the patient is free from visceral disease; and the case I have related is to me a strong encouragement for the practice. It is true that the boy ultimately died; but the benefit and comfort he derived from the amputation were most marked, and his death was quite unconnected with the amputation. What the cause of the abscesses in the brain was I cannot form any opinion. He had no symptoms of pyæmia whatever. A single attack of rigors is, it is true, noted a few days after the operation; but it was far away from the first occurrence of convulsions, at which time he seemed in perfect general health. In fact the rigors were clearly connected with the formation of matter in the wound of the excision. During life the existence of strumous tubercle in the brain was suspected; but I am assured by my friend Mr. Maude (then House-Surgeon of the Margate Infirmary), who made the post-mortem examination, that there was no trace of tubercle in connection with the abscesses.

The third case illustrates a point of practice which must be admitted to be still doubtful. Professor Fayrer, of Cal-

* Such at least is the reference in "Hodges on Excisions;" but I have not been able to verify it.

cutta, has called attention* to the symptoms of osteo-myelitis chiefly as it attacks bones after their division in amputations of the limbs; and he argues powerfully in favour of reamputation in such cases before pyæmia has set in, and gives one case where, after amputation of the thigh, he reamputated with success at the hip, on account of osteo-myelitis of the femur. Unfortunately I delayed in this case until the favourable moment was past, and general pyæmia was established. In this affection I believe that the diseased bone forms the focus from which, if I may so express it, the morbid matter radiates into the mass of the blood. There is, therefore, a moment previous to the passage of this same morbid matter at which it can be completely cut off, and the source of pyæmia removed. This hypothesis derives some support from the fact that in the case before us there had been distinct evidence on one occasion of the contamination of the system, and that no further symptoms of pyæmia occurred after the amputation, while the pyæmic deposits found after death were in such a state as to show that they were in all probability all formed at one and the same time, viz. the day before the amputation. Hence, if the source of pyæmia had been cut away a day earlier, the analogy of what took place after the amputation justifies us in believing that no further mischief would have occurred, and that the child would have recovered.

The commencement of diffuse or acute osteo-myelitis after excision of the hip is marked by the following symptoms: pain in the part; œdema or swelling extending down the limb; general fever, with quick pulse and increased temperature; and more especially by the recession of the soft parts, including the periosteum, from the sawn end of the bone, which is thus left denuded at the bottom of the wound. When these symptoms are well marked, it seems to me advisable to put the child under the influence of chloroform; and if the bone be found extensively affected (which can be judged of by the ease and extent to which the soft parts peel away from it), then to remove the limb at once.

* Indian Medical Annals, Oct. 1865.

XI. ON DISEASE OF THE BRAIN AS A RESULT OF DIABETES MELLITUS,

ILLUSTRATED BY THE

NARRATIVE OF A CASE (WITH CLINICAL OBSERVATIONS) IN WHICH
PARALYSIS, DUE TO SOFTENING OF THE BRAIN, CAME ON IN A DIA-
BETIC PATIENT, AND PROVED FATAL. FOLLOWED BY A NOTICE OF
FIFTEEN FATAL CASES OF DIABETES, CITED FROM THE RECORDS OF
THE HOSPITAL.*

THE very remarkable experiments on the lower animals by which, within the last few years, physiologists (preëminently Bernard and Schiff) have artificially induced glycosuria by injury inflicted on various parts of the nervous system, have doubtless prepared us to expect and directed us, under certain conditions, to the discovery of an *undue*¹ amount of sugar in the urine as a result of lesions and of disturbances of the nerves, spinal cord, and brain in man.

The object of this communication is to direct attention to the existence of cases of diabetes in which this order is inverted—of cases, that is, in which such lesions and disturbances of the nervous system appear to stand in the relation of *consequence* or *result* of the diabetic state.

On reviewing our general literature either of diabetes mellitus on the one hand, or of diseases of the brain and spinal cord on the other, it will be found that but slender reference is made to any association between them. Many morbid conditions of parts occurring in and associated with diabetic patients are classed by systematic writers as “complications,” or “secondary” or “concurrent” affections, such as cataract,² disease of the lungs (pneumonia or so-called

* The notes to which the numbers in the text refer are collected at the end of the paper.

phthisis), gastritis, carbuncles, gangrene, affections of the kidney, liver, &c.; but among them it is very rare to find that organic disease of the cerebro-spinal system is specifically dwelt upon. For example, Dr. Watson, in his *Lectures on the Principles and Practice of Physic* (1857, vol. ii. p. 650), after speaking of the connection which exists between diabetes and pulmonary disease, particularly "tubercular phthisis," observes: "Sometimes the disease terminates in incurable dropsy; and sometimes the patient is cut off suddenly either by apoplexy or by some peculiar affection of the stomach." He then alludes to the cutaneous complications, and describes the post-mortem appearances met with in fatal cases, but does not mention either the brain or spinal cord.

Dr. Tweedie, in his *Library of Medicine* (vol. iv. p. 284), in writing on the same subject, only observes that apoplexy is rare in diabetes. He makes no mention of actual change in the brain or spinal cord being found after death, and in no way alludes to any positive connection between diabetes and disease of these organs. Dr. Copland, in his *Dictionary of Practical Medicine* (1866, p. 198), observes casually that "in some instances the (diabetic) patient is suddenly cut off either by apoplexy or" &c.; and in considering the post-mortem changes which are to be met with in other organs, makes no mention of any changes as ever being discoverable in the brain. Again, Dr. Aitken, in his *Science and Practice of Medicine* (vol. ii. p. 143), quoting from Prout, speaks of certain diabetic patients in whom the saccharine principle has been conquered, as dying of "some sudden and overwhelming attack of internal inflammation, or of apoplexy;" but makes no further remarks bearing on the matter to which I refer. Neither does Prout himself, in his classical work on the *Nature and Treatment of Stomach and Renal Diseases*, do more than advert (as at p. 32 of the third edition) to his having seen the disease prove fatal by apoplexy.

So much for illustration of the subject by the most important of our more general or systematic authors on disease. On referring to the statements of those who have of late specially written on diabetes mellitus, I find a similar absence of explicit mention of any relationship between diabetes and disease of the nervous centres. Thus Dr. Bence Jones, in

the first of his recent Lectures on Chemical and Mechanical Diseases and their relationship,³ speaking of the complications which occur in diabetes, whilst making special mention of cataract, phthisis pulmonalis, and degeneration of the kidneys, and alluding to lepra, boils, carbuncles, mortification, &c., does not allude positively to any affection of the cerebro-spinal system, excepting to such as are induced by artificial means (by way of experiment). He nevertheless mentions cases of diabetes fatal by coma, but does not appear to have had the opportunity of procuring post-mortem investigation in these cases. Again, Dr. Harley, in the tenth of his recent Lectures on the Urine, and Diseases of the Urinary Organs,⁴ whilst alluding to cataract, disease of the kidney, chylous urine, gangrene, and inflammations, impotence, &c., as complications or result of diabetes, does not even make mention of any symptoms referrible to lesion of brain or spinal cord. Dr. Pavy, recognising the proneness to local inflammatory actions which exists in diabetic patients, speaks of disease of the pulmonary organs,⁵ diarrhœa, gangrene, &c., whilst he makes no reference to any affection of the brain or spinal cord. He observes, in his *Researches on the Nature and Treatment of Diabetes* (p. 116), "in all the post-mortem inspections that I have witnessed at Guy's Hospital the patients have died either from lung-mischief, diarrhœa, or a gradual atrophy, attended with a corresponding prostration of the vital powers." On referring to the eight cases which he details of fatal cases of diabetes observed at Guy's Hospital between the years 1857 and 1862 inclusive, it does not appear that the contents of the cranial or spinal cavities were examined.⁶

In thus quoting from the writings of these authors I refer solely to their descriptions of what may be termed persistent diabetes, to the exclusion of such cases, at times termed fugitive or intermittent, as have been found by several both English and foreign observers to have been occasioned by more or less temporary causes.

[As some of the readers of this communication may not have ready access to the literature of the subject, I venture to point out the chief of the causes of this *temporary* variety of diabetes, citing in foot-notes (collected at the end of the paper) some of the authorities on these points. This

form has been traced to traumatic and other varieties of lesion of the brain and other parts of the nervous system, including non-traumatic extravasation of blood,⁷ as also to certain general commotions of the nervous system,⁸ mental and emotional excitement,⁹ even old age,¹⁰ disturbance of the functions of the liver,¹¹ lungs,¹² inhalation of chloroform,¹³ affections of the skin and superficial parts, as boils, carbuncle, certain unwonted states of the blood,¹⁴ temporary fever, attacks of a convulsive character, such as eclampsia, hysteria, &c.,¹⁵ the use of certain articles of food¹⁶ or of medicine.¹⁷ I am myself inclined to think that the frequency of the casual or temporary production of glycosuria as a constituent of the urine in cases of disease or disordered function of various organs has been overrated; for I have been at the pains of examining the urine of a vast number of patients suffering from a variety of ailments, and have not once hit upon a case in which any appreciable amount of sugar-reaction was given by the use of Trommer's or Moore's tests.]

It thus appears that neither general and systematic nor special writers on diabetes mellitus have found occasion to include actual lesion of structure of brain or spinal cord as a *result* or *sequence* of this malady. The close and continued watching, however, of a typical case of the disease in question for a period of several months has compelled me to the conclusion that, whatever may be the more usual relationship between diabetes and disease of the brain when they are found to occur in the same patient, there are cases in which brain-lesion may follow in the train of diabetes, and grow out of it, being in no wise antecedent to or the cause of it.¹⁸ The case alluded to presents so many points of interest in addition to those dependent on brain-disorganisation, and is, I think, so generally instructive, that I will at once proceed to record it, and afterwards make such comments on its salient features as may appear to be desirable.

The patient, who had lived much abroad in France and Holland, rich but penurious, was in the habit of being weighed periodically. In January 1858 he weighed 16 stone 11 lbs. In Dec. 1859 he weighed 15 stone $3\frac{1}{4}$ lbs. About that time he became the subject of a so-termed "general illness of several months," terminating in jaundice, which lasted about five weeks and gradually subsided.¹⁹ In July 1860 he was found to weigh only 12 stone $7\frac{1}{4}$ lbs.; in March 1861 about the

same weight ; but in September 1862 he only weighed 11 stone 9 lbs. On the 28th of August 1862 I found him in the middle of the day in bed, and was informed that of late he had much kept to his bed and taken but little exercise. He had been in the habit of living far too sparingly. When I first saw him he was drinking very abundantly of all kinds of sweet and other pleasant drinks, and he assured me that he often felt as if he could commit any violence upon whomsoever he saw carrying water or other liquids, and who might refuse them to him. He ate but little, and scarcely ever meat. Though the weather was very hot, yet all the doors of his room were kept rigidly shut for the purpose of keeping out the flies, which were constantly attracted into his chamber, and which he was in the habit of catching by hundreds by means of the infusion of quassia. He was pale and thin, and his muscles were very flabby : his tongue was quite clean, but preternaturally red. He complained of his sight being defective. The pulse was regular, but feeble ; his extremities dry and cold. There was no cough, no anasarca of any part, and nothing wrong was discovered on physical examination of the organs of the chest or abdomen. The urine was, however, of a specific gravity of 1035, and, as tested by Moore's and Trommer's tests, found to contain a large amount of sugar : it was free from albumen. About six pints were passed in twenty-four hours. The bowels were apt to be confined, and the stools were generally of a light clay-colour. It was stated that his father used to be a great drinker of liquids, especially sweet ones, and the son was equally fond of sweets. He was at once treated with quinine, iron, cod-liver oil, and mild aperients. An animal diet was enforced, along with an absence of all saccharine and starchy articles of food, gluten-bread and bran-bread being used, and brandy with potash and Vichy water ; and in four days the twenty-four-hours' supply of urine was only of the specific gravity of 1031. On the 15th of September the specific gravity became reduced to 1030 ; and on the 22d of December it was only 1022, and perfectly free from such amount of sugar as could be indicated by the above-named tests, being only about three pints per diem.

During this time he was encouraged to take exercise in the open air as much as possible,²⁰ and he had apparently improved in animal spirits and in general tone, the tongue becoming much more natural ; but in October two peculiar and very painful "lumps" made their appearance in the tissues of the right leg, one being in the thigh and the other in the calf. They were of about the size of a walnut, and exceedingly tender when pressed upon, and appeared as if situated in the muscular substance of the joints ; and they produced great discomfort in walking.

At the end of December, as the urine was so diminished in quantity and so free from sugar, the patient was allowed to eat a certain amount of white bread daily, and this was continued for two weeks ; but he was evidently getting thinner and losing in strength. At this

time the "lump" in the thigh had disappeared, but the one in the calf continued as before. His sight was so bad that he was obliged to use a lens of considerable magnifying power. The urine was now again examined, and it was found to have a specific gravity of 1035, and to contain a large amount of sugar. The white bread was interdicted, and the bran-bread resumed (the gluten-bread was quite refused by the patient). Again on the 8th of February the urine showed no sugar by the fore-mentioned tests, and its specific gravity was 1022. Four days later the "brown" bread was given instead of the "bran" bread, and no sugar in the urine was indicated by the tests up to the 19th. At this time both the "lumps" in the legs had departed. Four ounces of white bread were then given per diem, and two very small potatoes owing to urgent entreaties allowed; but on the 23d the urine was again of specific gravity 1035, and contained plenty of sugar. Bran-bread was again returned to, to the exclusion of the potatoes and the white bread. On the 28th the urine had a specific gravity of 1025, and contained much less (but still a degree of) sugar; and on the 8th of March no sugar was detected, the specific gravity was 1025, and "brown bread" was again used, but without potatoes. On the 12th the specific gravity was up to 1035, and much sugar was indicated. "Bran-bread" was accordingly returned to. On the 16th of the month the specific gravity was 1030, but sugar was manifest: on the 19th it only 1022, and it was doubtful whether Trommer's test indicated sugar or not: but on the 21st this test indicated absence of sugar. From time to time much uric acid was found in the urine, quite irrespective of the amount of sugar. At this period there was a return of the painful "lump" in the calf.

During all this time he continued tonics of various kinds and also cod-liver oil. The potash and Vichy water were given from time to time as uric acid appeared in the urine, and alkaline drinks as acidity of stomach and flatulence showed themselves. Latterly the sight had gradually returned to its ordinary condition. On the 6th of April he was seized with "thickness" of speech, slight difficulty in swallowing (which he attributed to a sore throat owing to cold), partial paralysis of the *right* side of the face, and a sense of numbness in, and a diminished power of grasping with, the *right* hand. The corresponding leg did not seem to be affected. He was constantly in fear of being choked. Withal there was no febrile disturbance and no affection of vision. The mind was also entire, but he was much alarmed at his symptoms. On this day the bowels acted so abruptly as to give the idea that the sphincter ani was paralysed; but I am inclined to attribute this to mental emotion. Nothing was found to be wrong with the heart. I applied a blister to the nape of the neck; and on the following day the patient was seen by Dr. Watson along with myself. Three days later the urine showed traces of sugar, and had a specific gravity of 1027. The speech continued to be affected, and once vomiting came on, which was thought to be owing to indigestible food; and much pain

was complained of in the left shoulder and upper arm. Articulation, however, improved. On the 7th much numbness, with increased want of power and a sense of "pins and needles," were greatly complained of in the *left* hand. The mouth became less drawn to the left side, however; though the eyes assumed a very "staring" look.

About the middle of the month it was noticed that there was great weakness in all the limbs, the legs having decidedly lost muscular power. He was allowed a little roasted apple, and he appeared indifferent to food, having no particular desire for bread. The urine was tolerably abundant, but not passed in any very large amount. It now began to be passed involuntarily. There was no return of the vomiting, but a pain was complained of in the head, limited to a single spot above the left eyebrow. During this time the pupils of the eyes were natural in all respects and the mental faculties undisturbed: restless nights were, however, complained of, and it was said that twitchings of the face and hands were at times noticed during sleep. The voice was apt to be very "thick" in the morning. He had the phosphate of iron prescribed for him by Dr. Watson and myself, alternating with minute doses of strychnia. No sugar was now indicated in the urine by Trommer's tests; and he went on much the same from April until July, excepting that he obviously got weaker, and could only walk feebly with support; eating white bread along with his other food, but having only a poor appetite. The fingers of the left hand were generally drawn into the palm, but at that time there was no rigidity. The sensation of "pins and needles" was complained of in both hands, and both shoulders were exceedingly painful, but especially the left one. Perspiration was very considerable; at times this appeared to relieve the pains, as did the belladonna. The urine was generally alkaline in the morning, and acid in the evening. On the 7th of July vomiting of food returned on one occasion. Varying as to general strength, he went on until September, when the deficiency of power in the left arm became decidedly and rather suddenly more marked, the mouth became drawn to the opposite (the right) side, and the speech much worse. Moreover there was evident difficulty in opening the mouth, the patient appearing as if afraid to separate the jaws. At this time the urine was positively scanty and quite free from sugar as from albumen, but contained much uric acid. There was at times intense itching of the skin, especially about the neck and throat, relieved to a certain degree by opium and belladonna. Great pain was complained of almost constantly in all the limbs, and the legs were a little puffy. Sighing was noticed as being rather frequent, and irritability of temper extreme. Opium was given every night to relieve the pain and procure sleep, and iron and quinine from time to time.

In the beginning of November it was noticed on one or two occasions that the mind was confused, and *that he called objects by their wrong names*. He became much paler than usual, and continued to lose flesh, though he ate food better than formerly. The lump in the

left leg was now much less, but not quite gone. The itching of the skin became much diminished, not so the pains in the limbs; and about the end of September both arms were nearly powerless, the left being still the most so, and both legs were equally powerless. The fixed pain in the left part of the forehead was diminished, but at times complained of. In the beginning of December it was noticed that a slight divergency of the right eye existed (which was not noticeable when both eyes were turned to the right), also slight ptosis of the right eyelid. There was moreover a peculiar twitching of the muscles of the neck, by which the head was spasmodically twisted sharply round towards the right side, as if the patient was snatching at something with his mouth. Three attacks of exaggeration of all his symptoms occurred, and on the 11th of December he became suddenly drowsy, and so continued for two days, taking but little food. Blisters were applied to the neck, mustard cataplasms to the calves of the legs, and diuretics and diaphoretics given. The ptosis became more pronounced, and it was thought that the right arm had become more powerless. The evacuations were all passed involuntarily. The ptosis later on became still greater, the right eye more divergent, and its pupil much larger than that of the left eye. The sight was obviously defective; the tongue became protruded to the left, and the mouth was drawn to the right. Dysphagia became urgent, and the head was constantly bent forward, evidently from want of power in the muscles of the neck. On the 18th mucus accumulated in the bronchial tubes, the strabismus and ptosis more marked, the conjunctivæ of both eyeballs very congested and reddened; and he died in the evening.

Post-mortem examination, two days after death.—The body was extensively emaciated, and much red fluid oozed from the nostrils.

Thorax.—The lungs were quite natural in all respects; much thick mucus existed in the bronchial tubes. The heart was very softened and flabby; its texture being soon torn through, and its cavities quite empty. The various valves and lining membranes of the cavities were perfectly smooth and transparent, and free from any disease; but a considerable amount of atheromatous deposit existed in the walls of the root of the aorta, beneath the inner membrane, which was itself smooth and natural.

Abdomen.—The liver was quite natural; the kidneys were somewhat softened, and their substance was very dark with livid patches, as if from ecchymosis. Other organs natural.

Cranium.—The scalp and the bones of the skull presented nothing unusual. The dura-mater was considerably adherent to the skull generally, but was itself healthy. There was much dark staining of the cerebral membranes along the tracks of the blood-vessels. The surface of the brain presented no unnatural appearances; but on section it proved to be what is termed a "wet" brain. The anterior portion of the middle lobe of the brain, on the right side, was to a very great extent exceedingly softened, but not in any degree red-

dened or otherwise discoloured. On examining the arteries at the base of the brain, the middle cerebral one on the right side and in the neighbourhood of the softened portion of brain, was found to be plugged up with a mass of firmish fibrine. The coats of the vessel did not appear to be affected. Other parts of this hemisphere of the brain were natural. The corresponding portion of the middle lobe of the *left* side of the brain was also, but to a very slight degree, softened, and the middle cerebral artery occupied by a small plug.

This case appears to me to be on the whole so typical a one, and to present such various symptoms of clinical interest, that before speaking of the paralysis and brain-lesion in their relationship to the diabetic state, I will without apology advert to and analyse some of those symptoms.

In the first place, I have no exact data by which to determine when the glycosuric state became established. When I first saw the patient, in August 1862,²¹ it had probably existed a long time; for we obtained evidence that at any rate in the course of 1859 he began to lose flesh, and that this decrement had so advanced that in the place of weighing more than sixteen and a half stones, which in January 1858 he did, he was in the course of four and a half years reduced to eleven and a half stones. After he had begun to lose flesh, he suffered from an attack of jaundice; and it is not unlikely that he had some temporary affection of the liver (although certainly no indications of previous liver-disease were discoverable after death). If so, this fact is interesting when considered in connection with our modern knowledge of the relation between experimental interference with the innervation of the liver and the secretion of glucose from the kidney, and also with the belief entertained by Dr. Prout,²² "that the liver is always deeply involved in diabetes."

As respects *predisposing causes*, the patient had been to a considerable degree affected by *anxiety of mind*, was said to have lived a somewhat dissipated life, and had spent a good deal of his life at intervals in a flat and marshy country abroad; it would only be consistent with what is known of the disease generally to suppose that the mental condition had at any rate some causative relation to the disease. Moreover the dissipation of habits and penurious way of living must be taken into account in this matter. Passing over other more ordinary symptoms, I would here notice the *de-*

fective vision which came on, and for some time proved very troublesome and persistent. Subsequently the sight became restored, and nothing like the actual cataract or exudation into the retina,²³ which occur in some cases of diabetes, was noticed. The defective sight appears to have been merely the result of impaired visual accommodation, or amblyopia, or a kind of amaurosis (not of any lens-affection), the result of the altered state of the blood or condition of nervous system,²⁴ and during its continuance the pupils and muscles of the eyes were quite natural.

I will now pass on to speak of the urine, the saccharine state of which was very remarkably and unmistakably capable of modification at will, according to the supply of farinaceous or starchy food. Still, even when the urine had become free from glucose under regulation of diet, the patient's strength continued to diminish and the emaciation to progress. At a later time it was observed that uric acid passed freely in the urine, although sugar was being secreted contemporaneously.

As before said, the sight gradually returned to its ordinary state; but shortly after that (on the 6th of April 1863) paralysis of the *right* arm and *right* side of the face, evidently owing to the dilapidation in the left cerebral hemisphere, with dysphagia and vomiting, came on; and as these symptoms appeared, *sugar ceased to be found in the urine*, even though farinaceous food was permitted. This corresponds well with the statements of several observers, that in cases of diabetes the secretion by the kidney of sugar is wont to become arrested by the supervention of acute disease of various parts, on the approach of death, &c.²⁵

Subsequently difficulty of articulation came on, and loss of power of *all the limbs* occurred; but the mind remained unaffected. Later on, no doubt owing to the dilapidation of the opposite (the right) cerebral hemisphere, there was marked loss of power in the *left* arm, and the mouth became drawn to the right side, as if from paralysis of the left facial muscles, or from spasm of those on the right side (most probably the former). The apparent fear of opening the mouth may have resulted from a positive difficulty owing to paralysis of muscles on which the movement of the lower jaw depends. Still later, the *misapplication* of words, the speaking of

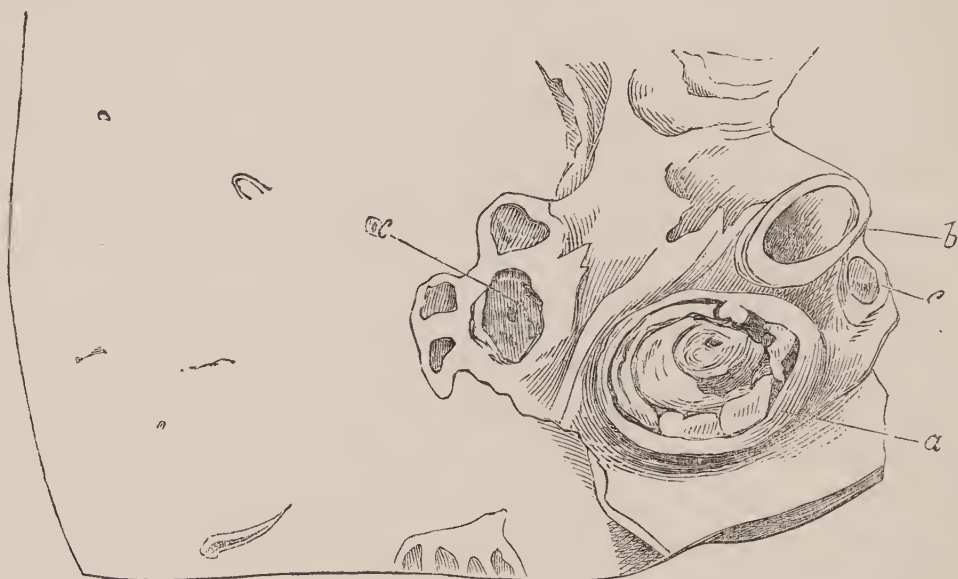
objects by their wrong name, is to be noticed;²⁶ also the extremely painful condition of many of the paralysed muscles of the limbs, especially of those of the arms; a condition often mistaken for rheumatism. Eventually both arms and both legs became perfectly powerless, and the patient was reduced to a most deplorable condition, suffering acute pain in his limbs, and being quite, or almost quite, unable to move them. At no time was there any positive convulsive action of the muscles, though at an early period of the paralytic attack it was said by attendants that a certain degree of twitching of the face and hands was observed; symptoms owing no doubt to irritation of the parts of the brain subsequently softened. The strabismus, ptosis, and peculiar twitching of the muscles of the neck, followed by their paralysis, which came on within a few days of death, are to be noticed. Before death we had coma, paralysis of the sphincters, and dilatation of the *right* pupil.

Having drawn attention on the one hand to the clinical history of the case, and on the other to the organic lesions discovered after death, apart from each other, it remains for me (and this is *the* object which I mainly contemplated in bringing this communication before the reader) to offer such observations as arise from the consideration of them in connection and as a whole.

I propose, therefore, to discuss the degree and kind of relationship which may be supposed to have existed between (1) the diabetic state; (2) the softening of the brain-tissue, with its resulting paralytic symptoms; and (3) the plugging by coagulum of the arterial branches which supplied the affected portions of brain.

Commencing with the last two of these factors, are we to understand either of them as having any dependence on the other? Having regard to the healthy condition of the heart's valves, and the lining membrane of its cavities, the immunity which the patient had enjoyed from rheumatic fever or any other blood-poisoning, likely to induce directly or indirectly, as far as we know, a tendency to the separation of fibrine from the blood, I do not at any rate surmise that the plugging of the intra-cranial vessels was an instance of embolism; neither, considering that the coagulum in the vessels was

evidently not of old standing, judging from its consistence, colour, and non-attachments to the arterial parietes, &c. can I look upon it as being an instance of disease of the arterial coats. Consequently, the probability is that this stoppage of the vessels was not primary or causative as respects the softening of the brain-structure.²⁷ I am very strongly inclined, contrariwise, to look upon the softening of the brain as primary, and productive of the occlusion of the vessels. This relationship may receive illustration from the accompanying diagram, which represents a portion of hepatised lung, re-



Woodcut showing a portion of lung in a state of consolidation. *a* points to a section of the pulmonary artery filled with laminated firm fibrinous coagulum; *b* to a section of a bronchial tube; *c* to portions of enlarged bronchial glands.

moved by myself from the body of a patient in the hospital, having in connection therewith a section of the pulmonary artery.²⁸ The lung may be seen to be quite solid, and the artery to be occupied by coagulum, which is firm, slightly discoloured, and manifestly composed, at any rate at its peripheral portions, of concentric layers. My belief is that the coagulum is in this case the *result* of obstruction to the course of the blood through the lung-texture. We know that as function of an organ ceases, there is stagnation of the current in the supplying capillaries; this going on, the blood in the smaller arteries, and finally in the larger ones, must also become stagnant as a consequence, especially if, from any reason, a proneness to precipitation of its fibrine has been en-

gendered in the blood;* we must thus have, I think, a tendency—owing to quiescence of the blood-stream—to the formation of clot. In this way I believe the concentrically disposed coagulum in the pulmonary artery, depicted in my drawing, was formed; and a similar condition I have frequently looked for and met with in post-mortem examinations of patients who have died of pneumonia, especially when confined to small districts of the organ, and lobular in character.²⁹

May we not then, in like manner, look upon the coagulum which I found in the brain-arteries of my diabetic patient as being an expression of the stagnation of the contained blood-current resulting from the disease of the cerebral substance, the blood probably being in a condition favourable to the deposition of its contained fibrine? I believe this view to be tenable. Concluding, then, that the arterial obstruction was secondary to, and the result of, the cerebral mischief, the next question which presents itself is that of the relationship between the cerebral mischief and the diabetic condition of the patient.

The experimental production at will of diabetes mellitus in some of the lower animals before adverted to, and also the discovery that certain affections of the nervous system caused by mechanical injury or by functional disturbances and organic disease may determine a state of glycosuria, would no doubt lead most of us, in any given case wherein diabetes and softening of any part of the brain coexisted, at once to declare that the presence of sugar in the urine was secondary to the brain-disease. Such would be the natural conclusion at first sight. But in the present instance what are the facts of the case? We have the existence of a most severe form of true persistent diabetes in a patient who had been the subject of very many of those influences and surrounded by those circumstances which are acknowledged to be preëminently favourable to, and are often considered as productive of, such a condition. I need not again enumerate them. This diabetic state

* The case from which the lung with the pulmonary artery just described was removed was one of pleuro-pneumonia, with hypertrophied and dilated heart and old and recent pericarditis. After death the lining of the left auricle and the mitral valve-flap were found to be beset with fibrinous deposits; the valves and cavities on the right side of the heart being natural.

had become more profound, and had persisted in its intensity for a series of months; all at once almost, the sugar is found in the urine in diminished quantity, and this declension advances in spite of an allowance of starch- and sugar-making articles of food, until no sugar whatever is appreciable by ordinary tests; *and contemporaneously with this diminution of sugar*, paralytic symptoms *suddenly* present themselves, the patient having been throughout his entire illness, and during the whole of his previous life, free from any thing that could be said to be even suggestive of such symptoms. The occurrence of these phenomena and the order of their sequence appear to my mind conclusively to indicate that the disease of the brain, instead of having been primary and determinative as regards the diabetic condition, was, at any rate, secondary to it in point of time. But, in addition to being secondary, and a complication of the diabetic state, was not this lesion, I would ask, resultant of, and produced by, this general morbid state? I believe this view is also tenable. Consequently, of the three factors referred to, it may be considered that the diabetic state stands in relation of cause to the deterioration or dilapidation of the brain, and this, in its turn, as cause of the occlusion of the arteries.

One more question of interest obtrudes itself, viz. seeing that the diabetic state may be looked upon as causative of the brain-lesion, what may reasonably be considered the mode by which the latter was originated? Remarks upon this inquiry I will postpone until a later period.

I will append the history of another case similar in some respects to, and illustrative of, the one which has hitherto occupied attention. For the opportunity of recording this I am indebted to M. Foster, Esq. junior, of Huntingdon. The details are contained in a letter, from which I make the needful extracts.

Mr. Foster writes as follows:

“The patient was one of eight children, two of whom died of phthisis, one of pneumonia, the rest living and well. His father died from calcification of aorta; his mother is alive (æ. 92), and considering her age, well. He was always sober, and in every way careful of his health, which until the last few years was very good. Of moderate height, muscular, of a somewhat fair complexion, he presented no marks of any particular disposition to disease.

About five or six years ago he suffered a good deal from pains in the back, which were then called lumbago. These were remedied by ordinary treatment, but returned at intervals. The pain was sometimes felt in the back of the hip, and so called sciatica.

He was then living in the spot where he died, at Purwell Mills, a farm close to a flour-mill worked by a small brook, and surrounded by flat meadows, which were liable to inundations.

About the same time and afterwards he complained of indigestion, and was subject to a looseness of bowels, apparently due to his food not being duly digested.

He once about this time had some sensations in his chest, which led one to fear angina pectoris. No abnormal sounds could, however, be heard connected with his heart, though its action seemed somewhat feeble and his pulse slow (60 per minute).

Notwithstanding these symptoms, however, he considered himself in pretty fair health until about two years ago, when he began to complain of great thirst, great feebleness and lassitude, a large quantity of urine, and especially dimness of vision.

His urine was then found to contain a large amount of sugar. He was examined carefully all over. No structural change existed in the eyes; heart as before; deficiency of respiration in one apex (I forget which), but nothing sufficiently decided to warrant the diagnosis of phthisis. Vertical measurement of liver two or three inches beyond the normal; dulness. Considerable tenderness in epigastrium and over liver. This condition of the liver led to the opinion that the diabetes was of that species, so to speak, beginning in the liver. He was placed on a diet free from starch and sugar.

In a very short time his urine became normal in quantity, and perfectly free from sugar. There was also an amelioration of his symptoms, though he did not consider he had regained his usual health. He continued in this way for some months: urine free from sugar when no sugar or starch was taken; strength moderately good, vision better, appetite good, but still a great deal of indigestion, *i. e.* of pain in region of stomach, flatulence, bad taste in mouth, &c. No increase in weight.

He did not like the starchless diet. He was naturally rather fond of pastry and sweets, felt the lack of them very much, and often took a morsel of bread or pudding to gratify his longing for them. He could always tell, however, by the quantity of his urine (as well as by the presence of sugar in it), and by his general symptoms, when he had taken any thing containing starch. He continued very much in this way, getting as he thought weaker, gradually losing flesh (1 lb. in two months), suffering much from the indigestion-symptoms and from dryness in the mouth; but with his urine normal, or even rather scanty in quantity, when his diet was free from starch.

When I saw him last winter he was thinner, looked worn, complained of always feeling tired. His appetite was not so good as it had been—was nothing like the ordinary diabetic appetite. His indi-

gestion-symptoms formed, however, his great trouble. His urine was normal in quantity, but contained (though he had taken no starch-food for several days, and then only a mouthful) a very large quantity of sugar. (I regret I cannot find my memorandum as to the exact amount.) His bowels, instead of being loose, became very confined. He now too complained much of pains all over him, especially in his legs, and also of very great weakness in his legs as compared with his arms. The pains in limbs, the dryness in the throat, the weakness and wasting continued and increased.

The week before his death he had a slight shivering fit, and access of pain over the left eyebrow. He suddenly became very much weaker. On the Saturday he was so weak that he could hardly get down stairs; there was still some pain over the left eye, though less than on the previous days; the dryness in the throat excessive; much pain round the epigastrium and both hypochondria; tenderness over the liver; no change in physical signs of chest; great weakness of legs; no distinct paralysis; no apparent loss or increase of sensation in skin; pupils both natural; pulse quicker than usual—75; no distinct febrile excitement; appetite gone; bowels very confined—only opened by enema. Had vomited some bilious fluid in the morning. Breathing rather laboured: this he attributed to his having pain round the belly. Quite conscious and in full powers of mind.

During Saturday night he had a few hours' sleep. On Sunday morning he seemed about the same. In the forenoon, while giving himself an injection, he vomited violently, and in doing so suddenly fell back *insensible*. After that he was never conscious, muttered only a few words, and gradually sank until the next morning, when he died.

I exceedingly regret that, owing to my being completely pushed with work during the next few days, I was unable to make a post-mortem. I put down apoplexy in the certificate, because it seemed to me most in accordance with the symptoms to suppose that some part of the brain had given way. Whether the part taken by the brain was purely secondary to a diabetic condition, having its source elsewhere, or whether the real matter was a disease of medulla oblongata, having diabetes as one of its effects, and ending on its own account in the way it did, of course cannot be settled from the mere history.⁷³⁰

In this case of Mr. Foster's it appears to me very probable that the insensibility and so-called apoplexy was the result of softening or degeneration of some part of the brain-substance. I would call to mind the fact, that in many cases of such softening the symptoms produced are perfectly sudden, and closely resemble in precipitancy those arising from cerebral extravasation of blood; and I am strongly of opinion that in many of the cases of diabetes, stated by observers³¹ to have ter-

minated in "apoplexy" or "coma," &c., especially when albuminuria did not exist, such a finality was dependent on brain-degeneration, and not merely the result of the sudden yielding of a blood-vessel and consequent blood-extravasation; although the faulty nutrition which accompanies the diabetic state might readily be supposed to induce weakening and disease of minute vessels, and thus a disposition to their rupture.

I will now pass on to the inquiry which I previously reserved—viz. that of the "mode" by which the diabetic state tends to bring about such changes in the brain as have engaged our thoughts. The answer to this must of necessity be a conjectural one.³² Are we to look upon all lesions described by writers under the term complications and concomitant or secondary affections in diabetes, as simply arising from defective or perverted nutrition resulting from the blood's being vitiated or poisoned by the sugar dissolved in it (and by the presence of which its general nutritive qualities are diminished, its healthy action on the nervous system, which regulates nutrition and secretion, impaired), and the dilapidation of the brain as one of these complications, the previously excessive formation of sugar being due to some prior morbid action³³ of the liver or other part directly engaged in the formation of sugar?³⁴ Or are we to consider that in this disease (in some cases, at least) the sugar of the stomach and intestines, whether taken as such in food, or produced from sugar-forming materials, does not undergo further necessary changes for nutritive and other ulterior ends (being, as it were, lost as respects its proper destination), and that in this way tissues and organs dependent on starch-food suffer? Or are we to regard the diabetic state as the result of some defective step in, or of some misdirection and perversion of, the ordinary secondary assimilative processes by which constituent portions of the entire frame, or of particular organs and parts, are broken down to an unwonted degree, and the débris eliminated as sugar? Under either of these latter suppositions, deficiency or absence of utilisation of the hydro-carbonous elements of the body (and most likely of the nitrogen also in those cases in which urea is excreted in unusually large quantities simultaneously with the elimination of sugar)³⁵ would be very harmful to the system, and

productive of deterioration, atrophy, or softening of organs. We might thus look upon all complications, of whatever kind, as correlative with the glycosuria itself, and as the common result of a general defective secondary assimilation, by whatever caused, showing itself first of all by the presence of sugar in the urine, the attendant ordinary symptoms of debility, &c., and later on (as the general morbid process extends and deepens) by special symptoms referrible to the dilapidation of the various viscera as these viscera become affected.

I would here draw attention to the views lately propounded by Dr. M'Donnell of Dublin, on the functions of the liver and the formation of amyloïd substance or animal dextrine, &c. He has been led to the conclusion that the liver in the natural state, by help of the amyloïd substance in its cells, acting as the basis of an azotised protoplasma, and not being merely changed into glucose, forms a nitrogen compound which becomes a constituent of the blood of the adult, just as the amyloïd substance of muscle is the basis of the material from which the evolution of muscular tissue is accomplished in the foetus.³⁶ The blood entering the liver by the portal vein contains much fibrine and albumen, thus contrasting with the blood in the hepatic veins, which contains but little, showing that these substances have become more or less decomposed; and Dr. M'Donnell supposes that whilst the hydro-carbons which enter into their composition go to form bile, the nitrogen reunites with the amyloïd substance (or animal dextrine), and thus forms a peculiar (what he terms proteic) compound, partly existing as globulin, and partly as a material resembling caseine or albuminose. This highly nitrogenous substance, if it really exists, must no doubt be considered to play a large and active physiological part in the nutrition and construction of tissues; and in seeking to establish the links between the diabetic state and the contingent dissolution, I would ask whether it might not be concluded that an interference with the formation of the substance above alluded to—that is, an interference with the due preparation in the liver of the fibrine and albumen for ulterior use, such as would obtain in cases of diabetes (wherein the changes in the amyloïd of the liver supposed to give rise to its formation

are interfered with), would prove most detrimental to the edification of the various parts of the organism, and tend to induce those intercurrent diseases or complications in which, in cases of diabetes, the source of danger mainly lies.

Whatever hypothetical view we are inclined to take regarding the *modus operandi* of the breaking-down of tissues and organs which we meet with in saccharine diabetes, and which tends to death, I think it a point of interest to bear in mind what I have attempted to establish, viz. that one casualty liable to arise in a special manner out of the diabetic condition is the affection of the nervous system, which I have dilated upon, and which does not seem to have hitherto obtained sufficient recognition.

The following is the list of fatal cases of diabetes (referred to in the paper) of which we have the record in our Hospital Post-mortem Books.

CASE I.—*Joseph J.*, æt. 23, was admitted October 16th, 1841, having diabetes, and in a state of pulmonary consumption. He died November 4th.

Post-mortem examination.—There was a considerable amount of pleural adhesion; and tubercular deposits, with vomicæ, were found in the lungs. The heart was pale and softish. The liver was large and “nutmeggy.” One of the kidneys was large, pale, and mottled; the other was atrophied, containing several calculi, *two of which were involved in a false membrane* in the pelvis of the organ.*

CASE II.—*Richard M.*, æt. 51, was admitted Jan. 24th, 1844, with a small cancerous tumour of the lower lip, having had diabetes certainly for two years. When admitted, though saccharine, the urine was not passed in an unusually large quantity. The tumour was removed, but did not heal very well, and secondary abscesses formed in joints and elsewhere. He became comatose, and died February 4th.

On post-mortem examination, the substance of the heart was found very softened, and purulent deposits were met with in the knee-joint and below the fasciæ, and in the rectus muscle of one leg; also beneath the mucous membrane of the larynx. The kidneys were congested; the brain and other organs presented nothing worthy of note; lungs healthy.†

CASE III.—*John M.*, æt. 42, was admitted early in 1845, with diabetes, of which he stated he had had symptoms for eight months. He then passed twelve to fifteen pints of urine in twenty-four hours. By means of opium and bitters he recovered, and left, passing only eight to nine pints daily. He remained the same until November, when he

* Post-mortem Book, 1841, fol. 176.

† Ibid. 1844, fol. 28.

caught cold, and had pain and oppression at the chest, with expectoration; and on December 3d he was admitted again into hospital with râles over most of the lungs. Paraphymosis came on, and he had to be operated on. Edema and rigors supervened on an erysipelatous state of arms and legs. At the same time the urine much decreased in quantity. The penis sloughed. On the 6th of January he only passed one pint and a half of urine, which still contained much sugar; but the specific gr. was only 1022. On the 8th, *not the slightest* trace of sugar was found in the urine, and he died on the 9th.

Post-mortem examination, thirty-four hours after death.—The organs were so putrefied, that it could hardly be ascertained what state they were in. The lungs were compressed, and did not contain much air, but were otherwise natural.*

CASE IV.—*George T.*, æt. 35, admitted March 11, 1846, with symptoms of diabetes of from six to eight months' standing. He had never lived in agueish districts, or had any cutaneous eruptions. The saliva and sputa were disagreeably sweet to the patient. *The inside of his trousers was covered with minute specks of sugar.* He was treated at various times with ammonia, steel, opium, and brandy. He had slight cough, but improved in all respects, excepting that he got thinner and weaker. He spat up scanty but foetid muco-purulent fluid, and gradually sank, and died December 21st.

Post-mortem examination.—Slight pleural adhesions existed. Several patches of (so-called) scrofulous matter were infiltrated in the left lung, but no masses of tubercle are said to have been found. The upper lobe of the right lung was almost quite converted into a large foul sloughy cavity. The kidneys were coarse.†

CASE V.—*Henry G. H.*, æt. 23, was admitted Sept. 22d, 1847, with symptoms of diabetes of two to three years' duration (apparently *not* hereditary). He had not lived out of London, or been subject to boils or skin-diseases. For a few months he had been liable to cough at times, with blood-stained sputum, emaciation, and œdema of the legs. No positive lung-symptoms were ascertained by the stethoscope. Under the use of bark, acids, and opium, he improved. On the 1st of October he experienced much pain in the right side of the chest, and he sank and died on the 4th.

Post-mortem examination.—The upper part of the lower lobe of the left lung was converted into a large sloughy abscess, with shreds and irregular walls, the surrounding parts being hepatised. The upper lobe of the right lung contained several patches of tubercles, and at the lower part was a small abscess of the same sloughy nature, but smaller than the one in the other lung. The kidneys were congested and coarse. Other organs presented nothing unusual.‡

CASE VI.—*William P.*, æt. 40, was admitted July 28th, 1852, with diabetic symptoms of one year's standing. The urine often passed in-

* Post-mortem Book, 1846, fol. 8.

† Ibid. fol. 268.

‡ Ibid. 1847, fol. 206.

Post-mortem examination.—Both legs contained much (so-called) serofulous deposit and several vomicæ. The kidneys (weighing 10 oz.) had their cortex narrow and contained a few cysts. Their cortices were open and rigid, and the pelves injected and red.*

CASE VII.—*Anne S.*, æt. 33, was admitted October 13th, 1854, stating that on an average she passed three gallons of urine daily. She was in a confused and partially stupid state of mind, and soon became comatose. After death, the urine in the bladder was found to contain sugar.

Post-mortem examination.—The lower parts of both lungs contained several small patches of a dark reddish-brown colour, breaking up readily under the finger, and giving out a light gray-coloured fluid. The kidneys were large, and their cortices of a light fawn-colour, the tubes thereof containing much granular and fatty matter. The lining of the stomach was much ecchymosed. The brain was particularly firm. Slight fluid under the arachnoid and in the ventricles existed, but no trace of sugar was found in it.†

CASE VIII.—*William R.*, æt. 44, was admitted early in 1856, with ascites and slight pneumonia, and had two attacks of hæmatemesis. At that time there was no suspicion of the existence of diabetes. He left the hospital somewhat improved (February 13th), the abdominal distension being still very perceptible. On the 12th of March he again came to the hospital much emaciated, and with undoubted symptoms of diabetes. He sank and died March 15th.

Post-mortem examination.—The lower part of the left lung was very much hepatised, the gray form predominating. Heart natural. The liver was large, rounded, and fatty, and kidneys granular and containing cysts. Other organs natural. There was much subarachnoid fluid; but the brain and cranial vessels, &c. were healthy.‡

CASE IX.—*Samuel E.*, æt. 20, was admitted May 13th, 1857, and died June 20th.

The body was not examined.§

CASE X.—*Elizabeth M.*, æt. 14, was admitted May 11th, 1859, with diabetic symptoms of fourteen months' standing (apparently not hereditary). After other treatment, she was for a time treated with sugar and treacle. Pain in head and chest came on. Subsequently she became comatose, the mouth being drawn to the right side, and there was strabismus. The respiration became 40 per minute, and she died June 14th.

Post-mortem examination.—The vessels of the brain were congested; but the brain, heart, and lungs were healthy. The liver was rather fatty; the kidneys were coarse and congested.||

CASE XI.—*Henry H.*, æt. 33, was admitted February 1, 1860, with diabetes, most probably of at least fifteen months' standing. He had no cough on admission. He was sometimes giddy, and his pupils were dilated. Ordered quinine and belladonna. On the 6th of April cough came on. The urine, which varied much, began on the 24th

* Post-mortem Book, 1852, fol. 160.

† Ibid. 1854, fol. 315.

‡ Ibid. 1857, fol. 146. § Ibid. 1856, fol. 860.

|| Ibid. 1859, fol. 136.

suddenly to diminish greatly, and severe diarrhoea set in. Pain in the right side, followed by hæmoptysis, came on. He greatly and quickly emaciated, sank, and died April 29th.

Post-mortem examination.—Scrofulous tubercles and vomicæ were found in both lungs. Much fibrin was found on the pleura of right lung. The kidneys were large ($13\frac{1}{2}$ oz.), lobulated, having congested cortices.*

CASE XII.—*Hugh P.*, æt. 55, was admitted June 12th, 1861. For seven months he had suffered pains in the legs, and cough with expectoration, and two months before, he lost flesh and noticed the urine to increase in quantity, and afterwards he spat blood. The urine was saccharine on admission, and evidence of consolidation of the lung existed. Œdema of the legs came on. Dyspnœa occurred suddenly, and he died June 20th.

Post-mortem examination.—Small tubercular scrofulous matters were scattered throughout the lungs, and a vomica existed in the upper part of the right lung; the lower part of this lung was infiltrated with a clear fluid, which could be squeezed out, giving to the tissue a grayish colour and gelatinous appearance, and every part of the lobe sank in water. The liver and kidneys appeared natural. Both supra-renal capsules were finely mottled with an appearance like that of liver, and each contained a small patch of fibrinous material in the centre.†

CASE XIII.—*Thomas H.*, æt. 36, was admitted May 25, 1864, with diabetes, and in a wretchedly prostrate state. Diabetic symptoms had been noticed at least six months, and latterly abscesses had formed in various parts of the body. In spite of stimulants, &c. the patient died on the 27th.

Post-mortem examination.—The brain was quite natural. The lungs were rather congested posteriorly, but were otherwise natural. The heart was natural. The kidneys were coarse and of large size, weighing together 15 oz. The liver and other organs were natural.‡

CASE XIV.—*James L.*, æt. 47, was admitted June 1st, 1864, with diabetic symptoms of at least six months' standing. A brother who had been in the hospital for diabetes had lately died, soon after his discharge from the hospital. He weighed 8 stone 9 pounds, having two years previously weighed 11 stone 4 pounds. He complained, among other symptoms, of his eyesight having got dim of late. Under the use of opium, cod-liver oil, and suitable diet, he gained much in flesh, and the urine in quantity and specific gravity became much reduced. He then took arsenic with opium. Later on, rigors, vomiting, and purging came on, with pains in the loins and cramp of the calves. Afterwards the patient fell into a state very like typhoid fever, but without any mental disturbance. He died July 2d.

Post-mortem examination.—The brain was quite natural in all parts. The lungs were congested, the heart soft and very fatty. The liver was large, weighing 9 pounds 2 ounces, and hard, and yellow and

* Post-mortem Book, 1860, fol. 128.

† Ibid. 1861, fol. 156.

‡ Ibid. 1864, fol. 146.

granular on its surface, and on sectional surfaces the colour was of a deep clay-colour. The gall-bladder contained a number of very small black gall-stones. The kidneys were softer than natural. The folds of the mucous membrane of the stomach had a thickened appearance. Other organs quite natural.*

CASE XV.—*John P.*, æt. 44, a sawyer, came into the hospital under my care June 20th, 1866. He stated that three months previously he had had erysipelas, followed by general debility; and for some weeks before admission he had noticed that the urine had been very large in quantity, and that he had lost flesh. For this he had been an out-patient. On admission, it was ascertained that he was suffering from diabetes mellitus. He was passing 168 oz. of urine (sp. gr. 1033) daily, which also contained a certain amount of albumen. He weighed 8 stone $6\frac{1}{2}$ pounds. I prescribed mineral acids and cod-liver oil, and the urine decreased in quantity. On the 25th spasmodic twitchings of the right arm came on, and subsequently of the right side of the face. Attacks of this spasm came on at uncertain but short intervals, and during their occurrence the mental functions remained entire. A blister was applied to the nape of the neck. The convulsive attacks continued, and the urine became diminished to 46 oz. in the twenty-four hours, and was subsequently passed in bed along with the stools. Dr. Heywood Smith, our resident house-physician, at my suggestion observed the temperature of the body, and found that on the 21st it was 97.9, on the 28th it was 99.3, and on the day afterwards (the 29th) a slight erysipelatous condition of the *right side* of the face came on.† The tongue became much furred, and the convulsive attacks much aggravated; and towards the evening he became unconscious, and the spasms affected both sides of the body. The eyeballs were drawn over to the right side first, and then to the left; and on the 30th the whole body was covered with an erysipelatous rash, thought by Dr. Thompson, our medical registrar, to be much resembling that of typhus. He was unconscious, but the pupils were natural. The urine could not be obtained for examination. He became much weaker, and died July 2.

Post-mortem examination.—The skull was very thick, and the brain, which was anæmic, was shrunk, and the convolutions rather prominent. A slight amount of fluid existed in the ventricles and subarachnoid space. The *fourth ventricle* was examined for me by Dr. Lockhart Clarke, who wrote to me as follows about the condition of the medulla oblongata, &c. He says: "By cutting the medulla into smaller pieces, and immersing them in a mixture of spirit and solution of chromic acid, I was enabled to make tolerably good sections—good enough to

* Post-mortem Book, 1864, fol. 190.

† In a diabetic girl, aged 19, Leubuscher observed (see *Archiv f. Path. Anat.* vol. xviii. pt. 1, 2) that the temperature of the skin was always below the normal degree, being only 95°, and only attained 96° during an acute attack. The patient died from *pneumonia*.

enable me to say positively whether or not there was any trace of disease.

"To the naked eye the whole of the medulla appeared perfectly healthy; but on examining these sections under the microscope, it was evident that the fourth ventricle, from the point of the calamus scriptorius upwards for about a quarter of an inch, was the seat of a finely granular deposit, extending through the epithelium for some distance down the raphè, in which, as well as in the substance of the medulla on each side of it, numerous corpora amylacea were interspersed. In no other part of the medulla, nor in the third ventricle, could I perceive any abnormal appearance. The central part of the pons seemed rather more vascular than usual; but this might be accidental."

The other parts of the brain presented no unusual appearances. The spinal cord was pale and natural. One hard tubercle, the size of a pea, existed in the apex of the right lung; otherwise the lungs, as also the heart, presented nothing worthy of note. The liver was pale and fatty, weighing 3 lbs. 3 oz., and the gall-bladder contained thin brownish-coloured fluid. The kidneys, weighing 12 oz. together, were soft, flabby, pale, and smooth, the cortical parts being large, and the tubules full of epithelium. The other organs were natural. There was no œdema of the body.*

Out of these fifteen cases (excluding Case IX., in which no post-mortem examination was made) it will be seen that in seven no tubercular or scrofular deposit is ascertained as having been found, though in two cases pneumonia was set up, and in one or two cases congestion of the lungs. In seven cases deposits in the lungs, described as scrofulous or tubercular, with or without vomicæ or abscess, are described.

Notes referred to in the pages of the preceding paper.

¹ I use the word 'undue,' because it has been clearly established by the experiments of Brücke of Vienna (see Sitzber, *d. Wien. Acad.* vols. xxviii. xxix. 1858, and Henle and Meissner, 1858), Dr. Bence Jones (see *Quarterly Journal of Chemical Science*, vol. xiv. p. 22, and *Lancet*, Jan. 19, 1861), and Schunk (*Philosophical Magazine*, March 1862), &c., that in health the urine always contains a certain very small amount of sugar, though this is doubted by Haughton and Jellett. The healthy blood has been long recognised as containing sugar; it has recently been borne evidence to by M'Donnell, Harley, and Von Becker. Prout seems in a degree to have acknowledged this, inasmuch as, at p. 14 of his work on the *Nature and Treatment of Stomach Diseases* (1847), he observes that "the blood of a perfectly healthy individual scarcely (*sic*) contains an appreciable quantity of sugar." It has been stated by Gigon, that healthy human urine always contains a certain amount of albumen, about 2·6 grammes being passed in a day (*L'Union Méd.* 1858, No. 12).

* Post-mortem Book, 1866, fol. 190.

² First distinctly pointed out, and illustrated emphatically, by our countryman Mr. France (see *Ophthalmic Hospital Reports*, Jan. 1859, and *Guy's Hospital Reports*, 1860-61) and Lecorché (see *Archives Générales de Médecine*, 1861, tom. i. ii.). Gräfe states (*Deutsche Klinik*, No. 10) that he found cataractous lenticular opacities in one quarter of diabetic cases.

³ *Medical Times and Gazette*, Jan. 28, 1865. Dr. Bence Jones recognises two great divisions, "two stages," of the disease. "In the first stage," he observes, "sugar alone ceases to go through the healthy chemical changes, whilst the animal sugar is entirely changed; in the second stage, animal sugar as well as vegetable sugar are more or less unchanged."

⁴ *Medical Times and Gazette*, Nov. 11, 1865. Dr. Harley recognises two distinct forms of diabetes: one in which there is no proof of an abnormal production of sugar by the liver, only a diminished consumption of that actually produced; and another form in which there is an excessive formation of sugar—in fact, defective assimilation or mal-nutrition.

⁵ Dr. Wilks observes, in his published *Lectures on Pathology*, p. 461, that the lung-mischief so often called phthisis, and described as attendant on diabetes, is, in fact, not of a tuberculous or strumous nature, but the result of simple inflammation, owing to a depressed state of constitution. Dr. Wilks informs me that Dr. Addison taught that phthisis merely meant a disorganisation of the lungs, and was not necessarily due to tubercle; and in the *Guy's Hospital Reports* for 1845 he had a plate representing a phthisical lung from a diabetic patient resulting from a low form of pneumonia and non-tubercular. Dr. Wilks has only ONCE seen tubercle in a diabetic patient: once he has seen diabetes terminate in gangrene of the lungs.

Dr. Pavy also (op. cit. p. 114) coincides with this view, and says: "I look on the so-called phthisis of diabetes as a chronic inflammatory affection, dependent on the presence of such an amount of sugar in the blood as to alter its natural quality and render it unfit for the healthy discharge of its functions."

A case I find related by Dr. Willett in the *Transactions of the Cork Medical and Surgical Society*, 1861-2, illustrates this point. The patient, a man aged 24, with diabetes mellitus, died of supposed phthisis pulmonalis. On post-mortem examination, gray hepatitis and abscess of the lung was found; and the observer remarks: "I think it also very difficult to state whether the suppurative condition arises from tubercle or chronic pneumonia, as, on feeling very carefully over both lungs, I could not trace a single hard substance between my fingers."

⁶ See at p. 175 an account of the post-mortem appearances observed in various fatal cases of diabetes met with in St. George's Hospital. Mr. Venables, in his *Practical Treatise on Diabetes* (1825, p. 99), relates the case of a diabetic woman who always complained of much pain in the lower part of the back and loins, in whom, after death, the spinal cord was found unequally hard throughout its length. In one spot it seemed dissolved or "softened down into a kind of excavation of its substance;" flakes of coagulated lymph being found upon the marrow and internal surface of the sheath, which was inflamed in several spots.

Fischer, in the *Archives Générales*, Oct. 1852, relates two cases of saccharine diabetes following fracture of the skull.

⁷ I have notes of the following case of diabetes which I watched, under Dr. Nairne's care in our Hospital. The man, æt. 40, with arcus senilis well marked, was admitted in a jaundiced condition, having pains at the stomach and right hypochondrium, with some epigastric swelling. The left pupil was quite insensible and very greatly dilated, and so situated to the left of the iris that its left margin was almost parallel with the edge of the cornea. The right pupil acted slightly, but was rather contracted. He had also had hæmoptysis and epistaxis. His statement was, that whilst work-

ing on a scaffold, five years previously, he had sustained a fall, and had much pain in the head afterwards, but that he had not been insensible; he had been ill ever since. He said he had never had double sight, but that he often fancied he saw "objects running about and things looking various colours, like scenery."

Again Dr. Pavy, in his work, cites the cases of an alderman who had an hemiplegic attack, of a medical man who had an apoplectic attack, of a man who had a violent blow on the head, and of another who had a fatal injury to the head; in all of whom a saccharine state of the blood came on. He also mentions the case of a man (op. cit. p. 78) in whom no evidence existed of his previously having had diabetes, and who suddenly fell down in an apoplectic fit, and in whose urine afterwards both albumen and sugar were found.

Dr. Noble, in the *British Medical Journal* (Jan. 17, 1863, p. 59), alludes to the celebrated case of Mr. Hopwood, a patient of Mr. Abraham Wood, the validity of whose will was questioned in 1855, and who suffered from disease of the brain in connection with glycosuria; and also relates other cases in which it appeared that "some causal relation subsists between certain pathological states of the brain and the excretion of sugar by the kidneys."

Tardieu, in the *Gazette des Hôpitaux* (janvier 1862), describes a case in which, along with diabetic symptoms, those of disorder of the nervous system came on, proceeding to paralysis of the left side of the body. The nervous symptoms abated, but the diabetes continued, and the patient died of pulmonary disease. After death congestion of the floor of the fourth ventricle, near the calamus scriptorius, was found, and the calibre of the neighbouring vessels was larger than natural.

Luys also (*Gazette Médicale*, 1860, No. 24, p. 384) describes the case of a diabetic in whom, after death, lesion of the anterior wall of the fourth ventricle was found.

See the description of the pons Varolii and fourth cerebral ventricle in Case XV., which I have quoted (at p. 179), of the fatal instances of diabetes in our Hospital.

Dr. Roberts (see *Lancet*, May 17, 1862) states that he found sugar in the urine in the complete insensibility of apoplexy from intracranial effusion and uræmia.

Griesinger found that out of 225 published cases of diabetes twenty appeared to be of traumatic origin. An interesting case, bearing on the subject, I find recorded by Dr. Girdlestone in his *Historical Sketch of Diabetes* (1799, p. 68): it was that of a boy who had "honey-tasted urine," who did not remain free from relapses of the disease "until dentition was completed." At p. 71 he also quotes from Bursarius the instance of a diabetic patient, æt. 70, who "had been attacked with the diabetes after a hemiplegia."

Dr. Richardson states that he found the symptoms of a diabetic patient much increased whenever he, as a house-painter, had to look constantly upwards, with the head thrown back, as in painting a ceiling.

Kunkler relates the case of a diabetic patient, æt. 26, in whom several tender spots at the upper part of the dorsal region of the spine existed, which disappeared on cupping, with setons; the sugar in the urine ceased to exist on the application of blisters to the neck, in spite of unchanged diet. (See *L'Union Méd.*, July 29, 1861.)

Dr. Buttura also related to the French Academy of Sciences a case of diabetes cured by the insertion of a seton in the neck. (See *British Medical Journal*, July 22, 1865.) As suppuration was established, the sugar in the urine gradually diminished. The patient quite recovered.

Abeille, in his *Traité des Maladies à Urines Albumineux et Sucrées* (p. 673), quotes several authorities who have described saccharine urine as following blows, falls on the head, fractures of the cranium, or traumatic injuries of the brain—such as Leudet, Guitard, Szokalski, Plagge, Strighson, &c.

Dr. Goolden also, in the *Lancet* for 1854, relates certain cases in which a diabetic state followed accidents to the head, diseases of the brain, &c., which disappeared on the use of purgatives and blistering.

⁸ In the *Sydenham Society's Year-Book for 1861*, p. 259, a case is quoted from the *Annuaire de Thérapeutique*, by Noirod, 1849, p. 43, in which diabetes supervened in a boy, æt. 16, after a blow on the occiput.

In the *London Medical Review*, Aug. 1861, Cardinale relates the case of a patient in whom diabetes succeeded a fall, and was treated successfully by the tinct. lyttæ.

Abeille (op. cit. p. 643) quotes from Plagge of Worms (*Arch. Path. Anat. et Physiolog.*, 1858) the case of a boy, aged fifteen, who after a blow on the head experienced strangury, then amblyopia, and symptoms of diabetes with sugar in the urine, which yielded to treatment. There were no symptoms of inflammation or traumatic lesion of the brain, &c. He also quotes a case related by Strighson (*Gaz. Med. Ital.*, May 17, 1858) of a man who received a blow on the head and became diabetic. Unlike what happened in the former case, jaundice and distress in the hepatic region came on.

Roberts quotes Fischer as having collected together twenty-two cases in which diabetic symptoms came on (sometimes at the time of the accident or shortly afterwards, sometimes not until after several months), following blows on the face, fractures of the vertebræ, blows on the loins, thorax, abdomen, contusions of kidneys and liver, violent efforts, &c. He observes that it is probable that in all the traumatic cases the injury implicated some part of the sympathetic nervous system. (See his *Practical Treatise on Urinary and Renal Diseases*, 1865, p. 168.)

⁹ Abeille quotes the authority of Bouchardat on this point, and cites cases related by Landouzy (*Gaz. des Hôpitaux*, 1862), and by Philippeaux and Vulpian (*Gaz. Hebdom.* 1862).

¹⁰ Dechambre, Raynoso, cited by Abeille (op. cit. p. 644).

¹¹ Abeille (op. cit. p. 673) alludes to the opinion held by some that certain diseases of the liver concur in the production of diabetes; but adds that it is not generally found to arise in cases of cirrhosis, and that probably hepatic lesions observed in diabetes are only secondary or consecutive. Pavy (op. cit. p. 102), on the contrary, considers that "the organ whose action is essentially at fault in diabetes is the liver;" but professes himself ignorant of the circumstances determining this defective action of the liver. He quotes a case mentioned by Bernard in his *Leçons de Physiologie*, 1855, p. 346, where glycosuria followed a blow over the region of the liver. The sugar disappeared as the patient recovered from the contusion, but he continued to pass large quantities of urine. Trousseau states that he had met with a case of temporary diabetes consecutive to a kick from a horse in the right flank. Dr. Tweedie (op. cit. vol. iv. p. 254), quoting from some German journal, records the fact of two, if not three cases of pregnancy, in which saccharine diabetes suddenly came on, and as quickly vanished after delivery. Both Harley and Pavy rendered the urine of animals saccharine by injecting into the portal system chloroform, ammonia, phosphoric acid, &c.

¹² Dr. Garrod, in the *Transactions of the Pathological Society*, vol. v. p. 331, after alluding to the opinion that sugar appears in the urine from deficient action of the respiratory function, while the sugar normally formed from amylaceous matter is incapable of being further changed into carbonic acid, relates the case of a female, æt. 50, who was the subject of acute bronchitis, and whose urine was found to contain sugar, owing, as it was thought, to the interference with respiration, and also albumen.

Dr. Charles Williams has lately related to me the case of a lady, aged 43, who had well-marked phthisis, and whose urine contained neither albumen nor sugar in August 1865. In February 1866 the tubercular disease appeared to be arrested; shortly afterwards, a carbuncle formed on the neck, and when it had nearly reached its height diabetic symptoms set in, and the urine was found to contain much sugar, which, on change of diet, diminished greatly. Death occurred from diarrhœa.

¹³ It was stated by Raynoso, and this has been corroborated by Schiff and by Pavy (see his *Researches in Diabetes*, &c., 1862, p. 78), that examination of healthy people after administration of chloroform determines the presence of sugar in the urine. Pavy has found this in the lower animals as well as in man; and he gives a list of *twenty* cases from the operating theatre of Guy's Hospital, with the examination of urine before and after the inhalation of chloroform, in all of which, excepting one, sugar was found after its administration, though in only four was any trace of sugar found previous to the chloroform. This result Pavy attributes to diminished respiration, by which the flow of blood is impeded, just as he thinks it is liable to be by violent muscular efforts compressing the liver, and by obstruction and disturbance of the breathing, as in whooping cough, coma, and pneumonia, by which means congestion of the liver as of other parts is occasioned. I mention these observations of Pavy because Dr. Roberts, in his remarks in the *Lancet*, before quoted (see page 182), states that, although he has repeatedly searched for the presence of sugar in the urine after the giving of chloroform, he has NEVER YET MET WITH IT; neither has he done so in the semi-comatose condition "attending the last stages of emphysema and heart-disease."

Dr. Richardson states (*Medical Times and Gazette*, March 8, 1862) that "dogs subjected to carbonic oxide, or even for a long time to carbonic acid, in small quantity, passed sometimes great quantities of urine, having a high specific gravity, and containing sugar in considerable amount."

Abeille (op. cit. p. 654) observes: "L'irritation du poulmon par les inspirations de chlore ou d'éther, augmente la production du sucre dans le foie. Cette production est en rapport avec l'intensité de la respiration, parce-qu'il y a transmission à l'encephale de cette action, proportionnellement à l'intensité de l'acte qui se passe dans le poulmon, et réaction proportionnelle du centre nerveux sur la foie."

¹⁴ Dr. Richardson observed a case (*Medical Times and Gazette*, March 8th, 1862) of diabetes which followed signs of inflammation of the cerebral membranes, and terminated in convulsions. After death a calcareous growth was found projecting from the basilar groove of the occipital bone a quarter of an inch long, pressing on the pons Varolii, and also abscess of the cerebrum (posterior lobes) was found. Raynoso and Michen state that the urine of hysterical and epileptic patients contains sugar after the attacks. Trousseau states that this has not been observed by all observers: I have myself several times looked for it in vain after such attacks. Becquerel (*Moniteur des Hôpitaux*, tom. v. p. 875) relates two cases of convulsions, one in connection with acute myelitis, and the other with general paralysis, in both of which albumen and sugar were met with in the urine, and appeared to be dependent on the convulsions. In the latter of these cases, whenever the convulsions ceased, the urine contained neither albumen nor sugar; and when they returned, the sugar re-appeared in the urine. This constantly and invariably occurred.

Dr. Goolden also has noticed glycosuria in the convulsions of children. He supposes that "few cases of chorea and epilepsy in young people occur without betraying a trace of sugar in the urine" (see *Lancet*, July 15, 1854).

¹⁵ As diminution of supply owing to ligature of the portal vein. Abeille (op. cit. p. 651) mentions the occurrence of obliteration of many branches of the portal vein being met with in fatal cases of diabetes; but regards this as a result. Andral, in the *Comptes Rendus*, tom. xxxiv. p. 468, mentions a similar case.

Dr. Hill has recorded four cases in which sugar was found in the urine after burns (see Beale's *Archives of Medicine*, 1861).

¹⁶ Griesinger appears to think a vegetable diet, specially a starchy one, decidedly influential in producing diabetes; and Abeille (op. cit. p. 672), though he does not rely on the facts as very important, mentions that in

countries where much fermented drinks are consumed, such as Holland, England, Ceylon, Bengal, Brazil, the disease is very rife. Barral, of Lisbon, would see in this a corroboration of the view that the disease depends on derangement of the digestive tube. Dr. Seegen observed cases of sugar in the urine apparently originating from starchy food (see Virchow, *Archiv*, vol. xxi.); and Harley and Schiff produced in themselves and in animals a saccharine state of urine by eating certain articles of food. Mr. James Rouse, late of St. George's Hospital, who has been much out in India, and is well acquainted with the health and customs of the natives, informs us that in certain parts, as in Oude, people are very subject to severe attacks of boils, which are attributed in many cases to their eating very large quantities of the sweet mango. May it not be that this saccharine fruit, continued for a length of time, may induce these boils in conjunction with a saccharine state of the urine?

¹⁷ Chevalier is said to have found sugar in the urine as a result of mercurial treatment.

¹⁸ Dr. Garrod relates, in the *British Medical Journal* (April 18, 1857), the case of a patient with diabetes of long standing who suffered from gangrene of the leg, and who, towards the end of life, had much purulent discharge from the ears. After death a large quantity of pus was found on the membranes of the brain.

¹⁹ Those who study the literature of saccharine diabetes will find that several of the older writers considered that some affection of the liver was at the root of the disease: in this anticipating in some degree the results arrived at by recent observers, experimental and others, regarding the connection between diabetes and direct or indirect interference with the hepatic functions.

²⁰ In passing, I may say that the necessity for this was very particularly dwelt upon. I will here quote the observation made by Trousseau, who, when speaking of the effects of exercise on diabetes, observes, "Un diabétique qui, chaque jour, fait à pied un exercice violent, peut, sans rien modifier à son régime, récupérer temporairement la santé qu'il avait perdue. J'ai connu des glycosuriques qui, au moment des chasses, cessaient de boire et d'uriner avec autant d'abondance, retrouvaient leurs forces, leur appétit, récupéraient, malgré les fatigues, leurs facultés viriles perdues depuis le début de la maladie."

²¹ The attraction of the large number of flies into the patient's bedroom by the saccharine state of the urine reminds me of a similar attraction of bees noticed by Trousseau in his *Clinique Médicale*, tom. ii. p. 576. Speaking there of a diabetic patient, he observes: "Il avait de plus remarqué que lorsqu'il pissait dans son jardin, ses urines laissaient sur le sol et sur l'herbe une trace inaccoutumée, que sur la place qu'elles avaient humectée, les abeilles venaient s'abattre et restaient pour y puiser les sucs qu'elles butinent ordinairement dans la corolle des fleurs."—Dr. Watson also, in his 77th *Lecture on the Principles and Practice of Physic*, vol. ii. p. 648, remarks: "I remember hearing from a diabetic patient in the Edinburgh Infirmary, that his attention was first drawn to his urine by the number of flies and wasps which its sweetness attracted to the chamber-pot." In No. IV. of the fifteen cases of diabetes cited at the end of this paper, it will be seen that the patient's trousers were wont to be covered with crystals of sugar deposited from the urine (or may it not have been from the perspiration?).

²² See the foot-note, p. 37 of his work before cited.

²³ See *Dublin Hospital Gazette*, Dec. 1861, p. 355.

²⁴ In the fatal case of diabetes with hemiplegia, related by Tardieu and before quoted (see p. 182), the affection of vision which came on was

found by the ophthalmoscope to depend on partial atrophy of the papilla. Dr. Moore, in the *Reports of the Dublin Pathological Society*, records the case of a diabetic man whose sight became greatly affected, and in whom, by means of oblique illumination, the lens and the capsule were found healthy; but the retina and the optic nerve were greatly diseased. See the *Dublin Quarterly Journal*, 1862, p. 454. See Abeille for ancient and modern authorities on defect of vision in the disease (op. cit. pp. 695, 696).

Hildige (see *Dublin Hospital Gazette*, Dec. 1, 1861) describes a case of exudation into the retina in diabetes.

²⁵ Bell speaks of this fact (see his *Essay on Diabetes*, translated by Markwick, 1842, p. 40) as occurring in the last stages of the disease, when the symptoms of phthisis became very severe, and says that the sugar ceases to appear during the occurrence of intermittent febrile affections; and he has seen the same in a case of pleurisy, and in one of pneumonia. Dr. Roberts mentions a case in the *Lancet*, May 17, 1862, p. 509, of a diabetic, in whom for three weeks before death the sugar could only be determined by the most delicate testing. He also notices the fact of the urine in diabetes temporarily returning almost to its natural state under several conditions; as abstinence from saccharine and amylaceous food, abstinence from all food, the "advent of intercurrent inflammation, as of the lungs or lining membrane of the bowels." Trousseau also (tom. ii. op. cit. p. 588) alludes to this disappearance of sugar in diabetes, and on the supervention of acute disease, owing, as he supposes, to the excitation necessary to stimulate the liver (according to Bernard's views) to the formation of sugar, being overstepped. Bernard found that, in his experiments on animals, alteration of the functions of digestion caused the sugar in the urine to cease whilst it lasted. It is also ascertained that animals when very sickly or ill cease to secrete sugar by the liver.

A case of remarkable diminution in the quantity of urine, and in the amount of sugar therein contained, is mentioned as having occurred in No. II. of those cases of diabetes cited at the end of this paper as having proved fatal at St. George's Hospital. Dr. Goolden (op. cit. p. 657) relates the case of a diabetic man in whom the urine suddenly ceased to contain sugar and diminished in quantity, after which pneumonia set in, and proved fatal by the formation of vomicae.

²⁶ It must be noticed that this symptom, which has been thought to rest solely on lesion of the left cerebral hemisphere, did not come on when other symptoms at an earlier time referrible to that supposed lesion occurred, but appeared after that the left arm became affected; that is, after that, as we may suppose, the right hemisphere had become involved.

²⁷ Trousseau suggests that possibly the spontaneous gangrene, simulating senile gangrene and such as attends certain severe fevers, which has been found by many to arise in the limbs, chin, nose, &c. and sometimes in the viscera, in certain cases of diabetes, may have been the result of obliteration of the small arterial branches or more important trunks.

²⁸ The preparation exists in our pathological museum, Series vii. No. 10.

²⁹ This point is illustrated by the formation of clot, owing to retardation of the blood-stream, that takes place in arteries which, in amputation of a limb, have been ligatured, or have been otherwise mechanically injured.

³⁰ *Note added by Mr. Foster.*—"It is rather curious that three cases of diabetes, that I have had in charge for the last two or three years, all died within a few weeks of each other. The first is the man whose case I have just related. The second a farmer of thirty-four years of age, who dated his illness from the severe frost of Christmas 1861-62, who stuck well to his starchless diet; whose urine was at first free from sugar when the diet was free, but afterwards contained much sugar under all circumstances;

who bore up bravely until this spring, when, after failing for some little time, he was suddenly cut off with *pneumonia*. The third a washerwoman, who was too poor to live on a starchless diet, who gave up all idea of restricting her eating, and who, though always weak and hungry, kept alive for three years, and at last died of albuminuria with anasarca, and from disorganisation of the hand after a blow. The case of this poor woman, and that of the patient of whom I wrote at large, seem to me to be as distinct a species of diabetes as possible, apparently brought about by different mechanisms, and which ought to have been treated on different methods."

³¹ Trousseau, in his *Clinique Médicale*, tom. ii. p. 587, after observing that diabetic patients generally die slowly of pulmonary disease, goes on to say, "dans d'autres cas, les malades sont emportés par des accidents cérébraux apoplectiques." He then describes the case of a patient with diabetes in whom hemiplegia of the right side came on, the face not being affected. After death, in addition to phthisis pulmonalis, softening with small masses of infiltrated blood were found in different parts of the brain on the right side.

Duncan, in his *Annals of Medicine*, 1796, vol. i. p. 343, quotes a case of Dr. Peter Shee's, who, having diabetes, became affected with a convulsive and paralytic affection of the right side.

Certain cases also of "sudden death" in diabetes may have been the result of softening which has been going on, and terminating in extravasation of blood tearing up the brain-tissue. Some cases of sudden death in diabetes are, however, described by observers, as by Dr. Cockle (see *Lancet*, 1862, vol. x. p. 38) in which no lesion of the brain was met with after death. Such cases are alluded to also by Bell, in his essay before quoted, p. 39. Others again, no doubt, are connected with collapse and sudden stoppage of the flow of urine, which comes on. Dr. Noble also describes (see *British Med. Jour.* for 1863, Jan. 17, p. 57) cases of sudden death coming on in diabetes.

Dr. Bence Jones (*Med. Times and Gazette*, Jan. 28, 1865) relates four cases of diabetes in which the patients died comatose; in these no post-mortem examination appears to have been made. Dr. Warburton Begbie has described a case of diabetes, terminating in coma (see *Edinburgh Med. Journal*, vol. vi. p. 1108). This I have also myself met with in practice: it was very quickly fatal in the case of a diabetic gentleman of middle age, who had albumen in the urine also, and whom I attended in his fatal illness, along with Dr. Hyde Salter, in May 1864. Collapse came on, with remarkably hurried breathing and coma, and in one day the patient died. In this case there was no œdema, no cough, or heart-disease. The patient had been known to have had diabetes for three years, but previously to that the great thirst which he suffered was thought to be "gastric," and he was treated, as it was stated, by strawberries. He had an uncle and a cousin also suffering from diabetes.

³² I once asked a physician of eminence in London, who has made urinary diseases his special study, how, in his opinion, diabetes proved fatal in those cases in which no apparent lesion of any organ exists. His reply was that "he was sure he did not know."

³³ As, for example, the supposed defective or arrested oxidation or other modification of chemical changes (interference with alkalinity, &c.), on which the excessive formation of uric acid is thought to depend.

³⁴ Dr. Pavy, in his *Researches on the Nature and Treatment of Diabetes*, p. 113, says: "I look upon the presence of sugar in the blood as the cause of those structural and functional disturbances that are so common in diabetes." A few lines further on, he observes: "But at the same time it must be admitted that in some cases there exists a source of interference with nutrition beyond what can be accounted for by the mere presence of sugar in the blood." "It would seem, in these cases, as if the cause which determines the saccharine state of the blood also does more than this, and affects

deeply the processes of nutrition." Prout (op. cit. p. 37), observing that the presence of sugar in the system neither depends on nor produces organic lesion of any particular organ, goes on to state that this absence of injury from the sugar in the blood "probably arises no less from its mild and innoxious character than from its great solubility in water."

³⁵ Dr. Ringer has observed in two cases of diabetes that urea was passed in the ratio of 1 to 2·2 of sugar (*Med.-Chir. Trans.* 1860, p. 323), and this under circumstances when the sugar could only be derived from the nitrogenous elements of the body, *i. e.* after a purely non-amylaceous and non-saccharine meal, when both urea and sugar were increased. Kane, some time ago, and lately Professor Haughton of Dublin, also describes the excess of urea passed by diabetics as arising from the splitting-up, or destruction, or metamorphosis of the integral nitrogenous parts of the body, or, as he terms it, the "perverted decomposition of nitrogenous tissues." See his paper on the Phenomena of Diabetes, read before the Association of the King and Queen's College of Physicians.

³⁶ Alias hepatine, glycogen, zoo-amylon, or animal starch. Dr. Pavy, whose opinion on the use and meaning of this substance differs so much from that of its discoverer, Professor Bernard, is inclined to think that its destination and function is the production of bile and fat. He found that alkalies injected into the portal vein destroyed the amyloid, and that it was increased by the use of vegetable diet (see *Med.-Chir. Review*, Oct. 1862, p. 355). The latter was also found to be the case by the Commission of the French Academy of Medicine appointed to consider the researches of Bernard and Sanson.

[P.S. Since sending the above communication to press, the voluminous work by Marchal De Calvi on Diabetic Complications has been put into my hand. To this I must refer the reader as containing additional information on affections of the cerebro-spinal axis in connection with diabetes.]

JOHN W. OGLE, M.D.

XII. ON JAUNDICE AND BILIOUSNESS.

PERHAPS there is no disease that is more intelligible than mechanical jaundice, or mechanical obstruction (for example, by a gall-stone), in the common duct.

Some slight error of chemistry, as extreme diminution of alkalescence, or perhaps slight acidity of the bile for a few minutes, may lead to the formation of cholesterin crystals, or to the precipitation of bile-acids, and thus the nucleus of a gall-stone would be produced. When this stone passes into the common duct, it stops the flow of bile; and by increasing the pressure of the bile in the bladder and in the ducts it causes an increase of diffusion of the bile into the blood. The different ingredients of the bile diffuse at different rates; and according to their properties, they are more or less acted on by the oxygen in the blood, and being more or less changed they diffuse into the textures and excreting glands, in which they are still further oxidised.

The relative diffusibility of the different substances in the bile has yet to be determined by accurate experiments, and their relative resistance to the action of oxygen under different circumstances is not known; but it is probable that the bile-acids are more oxidisable than the colouring matter and cholesterin, and that the rate of oxidation of the bile-acids will vary with the quantity of the bile-acids present, with the amount of alkali, and with the active condition of the oxygen in the blood.

The unaltered bile-acids possess highly energetic chemical properties, which do not at all belong to the cholesterin or colouring matter of the bile. For example, when applied directly to the heart, they greatly diminish the frequency and

force of contraction. This is caused by a direct paralyzing action on the striped muscular fibre of the heart, and also by a paralyzing action on the ganglionic nerves in the heart. On the nervous centres the unaltered bile-acids also have a strong poisonous action, causing sopor and ultimately coma.

But the most decided action of the unaltered bile-acids is on the blood-globules. These are dissolved and destroyed by the chemical action; so that they are deprived of their power of carrying on oxidation in any part. Direct experiments have shown that unaltered bile-acids can rapidly produce fatty degeneration of the liver, the kidneys, and the heart; and if ever the destruction of blood-globules takes place in any part of the brain, the action of oxygen there will be stopped, and from this convulsions will be produced.

When we turn from such cases of jaundice to the multitude of other cases in which no mechanical obstruction exists, our pathology and reasons for treatment are still very uncertain and very unsatisfactory; and if, instead of taking an extreme case of non-mechanical jaundice, we take that daily condition which is summed up in the word *bilious*, no clear view of the state of the patient, nor of the reason why relief is obtained by aperient medicine, mercury, or emetics, exists.

The assumption that the constituents of the bile are formed in the blood, and that their secretion from the blood may be suppressed or be defective, giving rise to jaundice or to biliousness, is contrary to all our present knowledge of secretion; and the further assumption that mercury, aperients, or emetics cause or accelerate the separation of the constituents of the bile from the blood by acting on the secreting cells of the liver, is founded on no certain facts.

It appears to me that the knowledge which we have lately acquired of the rapidity of the passage of fluids into and out of the blood into the textures, and the progress of investigation into the laws of the diffusion of liquids, and some post-mortem appearances hitherto unexplained, can now give us a much clearer insight than we have hitherto obtained into the state which we designate as bilious, and into very many, if not into all the cases which may be included in the large class of non-mechanical jaundice.

In all post-mortem examinations, when the gall-bladder

contains bile, the evidence of the passage of the bile through the walls of the bladder is very distinct. Certainly the colouring matter of the bile can diffuse through the bladder and into the adjoining intestine in less than twelve hours after death. This appearance has been long considered as the result of death; but from all we now know of the diffusion of liquids, there can be no doubt that the gall-bladder begins to allow the bile to diffuse through the mucous membrane into the blood-vessels as soon as any bile passes into it from the secreting structure of the liver; and only at the time when the gall-bladder is empty does bile cease to pass into the blood by diffusion. The thickness which separates the epithelium of the gall-bladder from the blood-vessels and from the absorbents is less than the whole thickness of the gall-bladder; and during life, the bile, before it can get to the outer surface of the gall-bladder, must pass through a layer of blood-vessels and absorbents, which, whilst the circulation continues, would continually carry off all the bile as quickly as it diffused out of the gall-bladder.

The greater the amount of fluid in the gall-bladder, the greater is the pressure, and the greater is the diffusing surface; and the diffusion would continue until the escape of bile into the bowel altered the conditions on which the action depends.

In the healthy state, the diffusion of bile from the gall-bladder into the blood rises from nothing to a maximum which is reached when the gall-bladder is distended to the uttermost; and the longer the gall-bladder remains distended, the greater is the amount of bile that passes into the blood.

The gall-bladder remains long distended when for many hours no food is taken; or when no food passes out of the stomach; or when opium is taken, which stops any motion of the duodenum; or when catarrhal inflammation of the duodenum exists; then, without any mechanical obstruction at the orifice of the common duct, the gall-bladder remains full of bile, and jaundice very commonly is produced.

The gall-bladder is emptied when solid food or irritating medicines pass through the duodenum; and the stronger the irritant, the more completely the gall-bladder empties itself. Even violent irritation of the stomach is propagated to the

duodenum, and causes the escape of bile from the gall-bladder, as is seen in the action of strong emetics.

It follows from these facts that diffusion of bile may be lessened by giving frequent emetics, or by those active purgatives which act on the duodenum strongly; and to get the maximum effect, that is, to reduce the diffusion to a minimum, irritants should be so given as to prevent the gall-bladder from becoming full.

The advantages which emetics have over purgatives is seen in the fact, that by emetics the bile is altogether removed, whilst after purgatives absorption of bile may still take place; for it is by no means disproved that an absorption of altered bile-acids and colouring matter does not take place from the intestines.

The first action of the intensely-acid gastric juice is to precipitate the bile-acids, and chemical changes continue to take place by which some portion of the altered acids may be made soluble.

The colouring matter also undergoes changes in the intestines, and some of it, most probably in health, is carried into the blood and textures, and is finally removed in the colouring matter of the urine.

The altered bile-acids and colouring matter probably has totally different chemical actions from the unaltered bile-acids and colouring matter that diffuse out of the gall-bladder and act so energetically on the blood and textures.

In the ordinary state of health, two causes prevent the bile that diffuses from producing any symptoms of biliousness or jaundice. First, the oxidising actions are sufficient to render the bile-acids harmless; and secondly, the quantity of bile-acids that pass into the blood, and from it into the textures, is not enough to retard materially the oxidising actions that go on in the blood and in the textures. But whenever the oxidising actions from any cause are reduced, or whenever the diffusion from the gall-bladder becomes excessive, then the symptoms which are summed up in the word *bilious* are produced; and if the want of oxidation or the excess of diffusion becomes very great, then jaundice is the final result.

On each of these causes of jaundice and biliousness I must say a few words. The jaundice from sub-oxidation arises whenever the balance between the quantity of bile

that diffuses into the blood and the quantity that is oxidised is destroyed in consequence of some arrest of oxidation. In some cases of pneumonia, for example, the balance is thus destroyed, and jaundice is produced. The same thing probably happens in some peculiar fermentations in the blood and textures, as, for example, in yellow fever; and still more probably, the jaundice of drunkards is also produced by deficient oxidation; and even the headache that follows a single excess probably arises from the action of the bile-acids on the brain.

In this also we seem to get a very clear idea how close hot air, as that of a confined room or cabin, will produce a bilious headache, and how fresh cold air will remove it or prevent it.

With regard to the jaundice which results from excessive production of bile, the most remarkable example is that which arises from nervous action.

The experiments of Claude Bernard have proved that the secretion of the salivary gland is controlled and increased according to the action of the sympathetic nerve and the chorda tympani on the arterial capillaries. If the filaments of the sympathetic nerve alone, as they enter the sublingual salivary gland, are tetanised, a highly concentrated saliva is secreted, and the blood flows out of the gland of a dark colour. If, on the contrary, the chorda tympani alone be tetanised, saliva is secreted copiously, containing no great proportion of solid matter, whilst the blood that flows out of the gland is highly coloured, like arterial blood, and sometimes the arterial impulse can be distinctly traced beyond the gland into the veins.

It is very probable that the sympathetic nerve in the liver, if tetanised, would stop the circulation by contracting the small blood-vessels; and this would diminish the secretion of bile; whilst the branches of the pneumo-gastric which enter the liver, when stimulated, would relax the small blood-vessels, and thus cause a more rapid circulation through the liver, from which an excessive formation of dilute bile would result.

Fright occasionally produces this jaundice; and it is the more likely to do so if, at the same time, any great interference with the oxidising action occurs; thus, for example,

when the congestion of the lungs after drowning acts with the fright in destroying the balance between the diffusion and oxidation of the bile, jaundice is most likely to occur.

Biliousness is only the faintest jaundice, and the same causes that ultimately produce jaundice give rise in the first instance to biliousness. But of all the causes of jaundice, sub-oxidation and excessive production of bile are the two most likely to stop at the stage of biliousness, and to remain long there without passing into the state of jaundice.

There are, then, four different causes of jaundice and of biliousness :

1st, mechanical jaundice, or jaundice from obstruction.

2dly, catarrhal jaundice, or jaundice from catarrh of the duodenum.

3dly, chemical jaundice, or jaundice from suboxidation.

4thly, nervous jaundice, or jaundice from excessive production of bile.

Another kind of jaundice has been assumed to exist, namely, jaundice from the suppression of the secretion of the bile. It has been said to depend on "defective action of the secreting substance of the liver, in consequence of which the secretion or the elimination of bile is arrested," or in consequence of the formation of the colouring matter of the bile in the blood and in the textures without the intervention of the secreting cells of the liver; and whenever in jaundice the bile-acids have been absent from the urine this blood-jaundice has been considered to exist.

In the present state of our knowledge, it is quite certain that substances still unknown must exist in the blood, and that from these the bile-acids and colouring matter are formed in the hepatic cells; these parent substances, whenever the secretion of the liver is suppressed, may accumulate in the blood, and undergo changes in the blood and textures; but then the bile would cease to be formed, and would disappear from the liver; and there is no proof whatever, that from "this defective action of the secreting substance of the liver, in consequence of which the secretion or the elimination of bile is arrested," jaundice would be produced.

The substances from which the bile would have been formed if the liver had continued to act, might, without doubt,

give rise to symptoms of poisoning, just as the substances out of which uric acid and urea are formed in the kidney become causes of death in cases of suppression of urine or extirpation of the kidneys; but these parent substances of the bile have yet to be found, and the symptoms they produce have to be accurately determined.

Probably this disease of suppression of bile will be found to be far more dangerous and far less remediable than any form of jaundice, and more closely resembling in its danger and rapidity suppression of urine than any other disease.

As the bile, by diffusion, passes out of the gall-bladder into the blood and textures, so also by the same property of diffusion the urine passes back from the urinary bladder into the blood and textures.

The urinary bladder is no glass or earthenware impermeable vessel, through the walls of which nothing can pass, but it is an animal membrane separating the urine on one side from the blood on the other side of the mucous membrane, and according to the surface and pressure the urine must pass back into the blood from the moment it arrives in the bladder until it is thrown out. Usually this emptying takes place so often that no urinous poisoning is produced. But if from any cause the urine is long retained in the bladder, then the poisoning by the urine becomes evident; and if the retention in the bladder is repeated at short intervals the urinous condition of the blood rises, and as it rises, each texture of the body is by diffusion impregnated with the poisonous matters which act according to their properties and those of the different textures with which they come in contact. These poisonous matters are quite different from those which are formed when the kidneys are extirpated, or when total suppression of urine occurs. The symptoms in both kinds of poisoning differ in urgency, and death may ultimately result from both; but chemically they are two separate diseases; and the two corresponding states, which arise from the non-formation of bile and from the excessive diffusion of bile from the liver into the blood, must not be confounded under the common term jaundice, which almost certainly cannot occur when the secretion of bile is suppressed.

The absorption of urine from the bladder constitutes, then,

a disease corresponding to jaundice; but from the frequency of emptying the bladder this diffusion sets up no symptoms until retention of urine from any cause is produced; then poisoning from urates, urea, and other urinary substances, occurs more or less quickly according to the amount absorbed directly, and according to the amount thrown out by the bowels, stomach, and skin inversely. Even at the worst this poisoning is not so rapidly fatal as the poisoning by kreatin, kreatinine, and other high compounds out of which the lower urinary substances are produced in the kidneys. This suppression-poisoning constitutes the so-called uræmia of Bright's disease, and it is the same as the poisoning produced by extirpation of the kidneys or suppression of the urine; and it corresponds with the disease produced when the secretion of bile is suppressed. For this poisoning I propose the term *cholegenous*, and for the analogous state of poisoning from substances that ultimately would become urine the term *urinogenous* poisoning, to distinguish it from the urinous poisoning (or true uræmia) which is produced by the absorption of the perfectly-formed urine and its passage into and action on the different textures of which the body is composed.

Some increased clearness as to the use of remedies for jaundice arises from the consideration of the different ways in which it is produced.

In mechanical jaundice the treatment should consist in stopping the pain by general or local anæsthetics or by subcutaneous injections.

In catarrhal jaundice the inflammation of the duodenum should be the object of treatment.

In the chemical and nervous jaundice and biliousness the gall-bladder should be frequently emptied—if possible, two, or three, or four times daily; whilst oxidation should be promoted by giving the least oxidisable food and the greatest amount of air and of fixed alkalis.

HENRY BENCE JONES, M.D.

XIII. ON PARALYSIS OCCURRING IN CHILDBED.

UNTIL within the last few years, little or nothing had been recorded upon an interesting form of palsy, which, from its associations, is termed puerperal paralysis. In this country we have become familiar with it chiefly by the writings of Drs. Lever, Simpson, and Churchill; on the continent Scanzoni appears to be the only author who has directed special attention to this affection.

My observation has been drawn to the subject because I have lately met with three cases of paralysis in childbed. I purpose giving their details, with some remarks upon this important malady.

I am well aware that there are cases of paralysis in childbed and during pregnancy which may arise in a great measure, if not entirely, from other causes besides those depending on the state of utero-gestation and labour; but in those to which I am about to allude, their history, progress, but especially their termination, are usually so different from the sequence of events in ordinary paralysis, that it is impossible, as Sir J. Simpson says, to doubt their dependence on the disturbances attending the puerperal state.

In the paralysis of pregnancy and childbed, it is essential that we should be able to form a true estimate of its origin, and thus be in a position to give an opinion upon its probable duration. As the exciting cause is but temporary, so the paralysis, though it may persist for some time after labour, is not as a rule permanent, and a tolerably confident prognosis may be given. Thus a happy contrast is here seen to those lamentable and incurable cases daily met with in both

sexes, and against which all our pathological and therapeutical researches of late years are of no avail.

The first case I shall offer is an example of paralysis arising probably from a mechanical cause; in other words, from injury to the muscles and nerves, one or both, during labour. The symptoms have shown themselves after two confinements in the same lady, otherwise perfectly healthy. I will give them as described by the husband, a medical friend in the Lake district.

"Mrs. B.'s symptoms evidently depended upon pressure during labour. She had, as the head was entering the pelvis, the most violent cramps I ever witnessed, followed after a time by complete loss of both sensation and motion in the lower extremities, which were gradually restored in some three or four months. The presentation was natural; there was no albumen in the urine, and no cerebral disturbance throughout."

If this case be not an example of the ill effects occasionally seen of pressure, I know not to what to attribute the symptoms. Some altogether deny that pressure can be the cause. Scanzoni admits its importance in a few cases. Romberg* speaks of "paralysis connected with morbid conditions of the sexual system, arising either from direct pressure of the distended uterus or ovary upon the nervous plexuses of the lower extremities, or caused by a reflex influence on the spinal cord, and then always affecting both sides of the body." On the other hand, Lisfranc† says "that there is no warrant whatever for our attributing the symptoms to compression of the sciatic plexus and obturator nerve." To what cause are the cramps of labour due? Sometimes certainly to a reflex irritation; but numbness is usually present, and they take place for the most part when the uterus is exerting the greatest force on its contents, and so on the pelvis generally.

Morgagni‡ devotes a page to "lameness subsequent to parturition." And in the efforts of a difficult labour "this bruising might happen to other muscles situated within the pelvis, near the gravid uterus, especially the iliacus internus and psoas muscles."

* Diseases of the Nervous System, vol. ii. p. 390,—Sydenham Society's Transactions.

† Journal de l'Anat., de la Physiol. du Système Nerveux, 1843, vol. i.

‡ Seats and Causes of Diseases, vol. ii.

Reflecting on the causes of ordinary paralysis, we find that it occasionally takes its origin from an injury to certain muscles or nerves. Both Abercrombie and Graves give cases of paralysis from leaning on hard substances, or lying for a length of time in peculiar positions. In those cases of pelvic cellulitis in which there is an impediment to the free action of the iliacus internus and psoas muscles, the patient is unable to straighten the thigh or stand upright, as first noticed by Dr. Churchill, and specially dwelt upon by Dr. M'Clin-tock, as diagnostic of the seat of the abscess.

The comparative rarity of paraplegia in women is a cogent reason for not regarding pressure to be its sole cause. In his work on *Paralysis of the Lower Extremities*, Brown-Séquard gives a table showing the relative frequency of the various forms of paraplegia in men and women. Of 150 cases, 110 occurred in men, 40 in women. He gives no reason for this disproportion.

Many years since, Dr. Baillie* noticed the same fact; "for which it is by no means difficult to account, considering the greater hurry or activity of life pursued by the former." The difference, I believe, proceeds mainly from two prominent causes: first, that the ordinary avocations of the male sex, especially amongst the labouring classes, render them more liable to accidents and injuries of various kinds; secondly, that so large a number of the male sex is debilitated by seminal losses. The female sex suffers extensively from irritation of the sexual organs; but this does not produce so marked an effect on the nervous system as the frequent outpouring of the seminal fluid.

Dr. Lever gives some remarkable cases of reflex paralysis during pregnancy. In my experience as a physician-accoucheur I have never met with one before delivery. The following was supposed to be an example of it after confinement.

A lady lost a child from diphtheria. A fortnight afterwards she gave birth to twins at the full time, both still-born. There was nothing abnormal in the labour; convalescence was very slow; and as soon as she was able to be moved she went to Margate, and almost immediately began to feel some slight loss of power in the hands. Her medical man treated it very lightly, though she positively asserted

* Trans. Med. vol. vi. art. 2.

that this loss of power speedily increased. She returned to town, and gradually lost all power of movement in both upper and lower extremities. She could not feed herself, and was obliged to be lifted from the bed to the sofa. There was no loss of sensation, and in other respects she was pretty well; no albumen in the urine, no headache, no pain in the back; special senses perfect. These symptoms remained for some weeks, with little or no change. She was seen on several occasions by Mr. Henry Lee. In about three months she perfectly recovered, and has lately been confined without any untoward symptom.

In this case the term "reflex paralysis" may be objected to—perhaps rightly so. The temperament excluded hysterical paralysis. All the symptoms might possibly have been due to muscular weakness from want of nutrition, the muscles being too weak to counteract the mere force of gravitation. If not to this cause, remembering that there was mental anxiety as well as physical exhaustion, can we attribute them to what Dr. Gull* aptly terms "central exhaustion of the cord"? Or, as I think most probable, did they proceed from irritation conveyed to the cord from the uterus; as we see in the paraplegia from uterine ulceration and carcinoma? Cases are recorded in the reports just named of paralysis from disease of the kidneys, from gonorrhœa, and from stricture. In some at any rate of these no change in the structure of the cord was detected; and if we admit such a starting-point from the male, equally must we concede the same from the female organs of generation.

Lastly, the mode of disappearance of this form of palsy, which is usually rapid, points much more strongly to a reflex than a mechanical source.

In his work on cattle, Youatt says: "It is called dropping after calving, because it follows that process, and one of the prominent symptoms of the complaint is the loss of power over the motion of the hind limbs, and consequent inability to stand; in a great number of cases loss of feeling accompanies that of voluntary motion, and no sense of pain is evinced, although the cow is deeply pricked in her hind limbs."

The following lines from the same authority are so pertinent to the case I have described that I cannot help quoting them. "A very singular variety of the disease has already been hinted at. The cow is down; *but there is apparently*

* Guy's Hospital Reports, 1856, '58, '61.

nothing more the matter with her than that she is unable to rise ; she eats, and drinks, and ruminates as usual. In this state she continues from two days to a fortnight, and then she gets up well."

By far the most serious are those cases of puerperal paralysis which have their origin in an altered condition of the blood. Frerichs speaks of the increase of water and of fibrin, diminished quantity of albumen, diminution of the red and increase of the white corpuscles in the blood of pregnant women. Sir J. Simpson says: "During the puerperal condition the blood is more loaded with new materials, intended some for excretion, some for secretion, than at any other period of life, and hence is especially liable to any diseased changes under the superaddition of any exciting or septic causes."

Not uncommonly another source of disturbance is present, that is albuminuria, rendering the parturient woman more than usually liable to hæmorrhage, convulsions, paralysis, lesions of sight and hearing. A case is recorded by Dr. Robert Lee,* of amaurosis and oedema of the face, with albuminuria, relieved by the induction of premature labour; and in Churchill's *Diseases of Women* there is a similar case at the eighth month of pregnancy, which became so urgent that labour was artificially brought on. Dr. Eastlake† mentions a case in which amaurosis occurred eight times in succession after parturition; Dr. Lever‡ a case of deafness in which the hearing returned soon after confinement.

Another form of paralysis in childbed is that owing to arterial obstruction from embolism occurring after severe hæmorrhage, metritis, phlebitis, and phlegmasia dolens. Speaking of hæmorrhage, Dr. Meigs of Philadelphia has made some observations specially applicable, I think, to these cases. "If she faints badly"—referring to a woman after delivery—"whilst her blood is becoming thin and highly coagulable from hæmorrhage, the scarcely-moving current partially stops in the heart, and if she comes out of the fainting fit, she has probably a false polypus in the cavities."

* Lancet, June 1863.

† Obstet. Trans. 1863.

‡ Guy's Hospital Reports, 1847.

In 1684 Dr. Gould drew attention—in the *Philosophical Transactions*—to certain forms of concretion from which portions of fibrin may be borne away, and being carried into the extreme parts of the circulation may plug-up the finer vessels and stop the nutrition of the part beyond.

More recently (as is well known) Drs. Kirkes, Virchow, and numbers of others, have alluded to this form of obstruction.

Such is undoubtedly the origin of the paralysis occasionally met with in phlegmasia dolens, to which Dr. Todd refers in the *Cyclopædia of Medicine*. An example of it has lately come before me; it happened in the practice of my friend Mr. Nazer.

L. C., æt. 15 years, in labour about four hours. There was a considerable amount of hæmorrhage after the birth of the placenta. In the course of a week or ten days she was seized with phlegmasia dolens in the right leg, and some days subsequently to this attack she was suddenly taken with hemiplegia on the same side of the body; the face was free, but the arm and leg were perfectly useless. The phlegmasia dolens gradually subsided, but the paralysis remained for a much longer period. In fourteen months from the commencement of the attack she could walk three or four miles; there was still, however, a slight dragging of the leg.

Before sketching the treatment to be adopted for the relief of any case of paralysis occurring in childbed, it is indispensable that we clearly distinguish between the several sources from which it may arise, and refer it to one or other of them. In the form due to mere mechanical pressure, probably rest, careful attention to cleanliness, regulation of the secretions, with good nourishment, will suffice in time. In that due to central exhaustion, the more assimilable tonics—iron, phosphorus, &c.—are likely to be most valuable aids. Here, too, strychnine may be cautiously employed, and stimulants will be of much service; change of air, cheerful society, and mental tonics, so to speak, are indicated; in short, every means of repairing wasted nerve-force. When the symptoms are referable to local uterine disease, or to blood-poisoning, our efforts at cure must of course be directed to the removal or amelioration of these sources of mischief. As, however, the treatment of them is familiar to each of us, I shall not presume to dwell on either form.

In the case I first described, although there does not seem to have been any special impediment to the natural progress of labour, yet, as at a certain stage the cramps are reported to have been unusually severe and the symptoms of paralysis have shown themselves immediately after two confinements, it is not improbable that there may be some slight departure from the normal dimensions of the pelvis, and if so, even a brief delay would justify active interference which could shorten the duration of pressure by an early resort to the long forceps.

In the treatment of phlegmasia dolens the patient should not incautiously leave the recumbent position; and, bearing in mind the dangers of puerperal embolism, there is an important point worth remembering, particularly insisted upon by Dr. Barnes. Presuming there are lesions of the nervous centres sometimes due to phlegmasia dolens, he questions the propriety of rubbing the limbs, as by such means portions of coagula are likely to be detached.

In conclusion, I would remark, that though in some cases of puerperal paralysis little or no assistance is afforded by medicine, yet, from the knowledge that notwithstanding their formidable features they usually terminate favourably, we are enabled to administer those mental tonics already adverted to—in other words, to impart comfort and confidence to our patient. All can testify to the rarity of the disease which I have been discussing; it is therefore the more necessary that we should be able to recognise its distinguishing peculiarities when it crosses our path.

E. F. FUSSELL, M.D.

XIV. REMARKS UPON THE MODUS OPERANDI OF HYPODERMIC INJECTIONS.

“THIS question of the local and limited influence of medicines is one of the most important that can be raised in therapeutics.”*

This passage occurs in a long review on some of the recent contributions, upon the hypodermic injection, to medical science.

The recent observations of Moore, Saemann, Scarengio, Pihan Dufeillay, Winter, Eulenburg, and myself, are there criticised; and the experiments of many others are alluded to.

A considerable portion of the article is devoted to an examination of the views I have from time to time ventured to express with regard to this mode of treatment, and more especially concerning the necessity or non-necessity for operating locally.

The writer of the article (Dr. La Sègue), who has always performed localisation, has not badly conceived nor unfairly reviewed my opinions. He is astonished at the effects of the distant injection, and quotes several of the cases from my last memoir on this subject,† in which I cured various cases of sciatica by the injection into the arm. He is, however, inclined “to push my theory” for me a little further than I can undertake to follow, or vouch for it; and he has been rather in error in thinking that I wish entirely to exclude the other modes of absorption in favour of that from the cellular tissue.

* Archives Générales, Janvier 1866,—Revue Critique de la Médication Hypodermique.

† On the Speedy Relief of Pain by the Hypodermic Method, 1865: Churchill.

As many writers have from time to time discussed and differed from my view of the action of hypodermic injections—beginning with Behier, who, in the very communication which first introduced the method into France, differed from me as to localisation—I will devote a few pages to a consideration of this *quæstio vexata*.

It was in the wards of St. George's Hospital that neuralgia was first treated by the subcutaneous injection at a distance from the seat of the paroxysm, and that the hypodermic method was first employed for *other* than neuralgic affections.

Whilst house-surgeon to the hospital in 1858, and employing the local method of Wood upon neuralgic cases, it occurred to me, in order to obviate certain inconveniences attending the localisation to the "principal painful points of Valleix,"* to try the injection at a distance from the part affected.

My experiments were made under the eyes of the physicians and surgeons of the hospital, and of the pupils of that day, many of whom watched with interest and kindly assisted me during the investigation.

Cases of sciatica were treated, some by the local injection, others by the puncture in the arm. Cases of neuralgia were likewise treated, *both* locally and by the remote injection.

My conclusion in October 1858 was, "that by injection into the cellular tissue of a part distant from that affected with the neuralgia, the relief that followed was quite as great as when they were performed locally."†

This is the point at issue,—the necessity for localisation. Important as this question appears to the mind of Dr. La Sègue, it has been little considered until very lately as a scientific question in England, but it has been the subject of much inquiry abroad.

The majority of French operators at the present time seem to consider localisation to the painful part necessary in cases of neuralgia. In England the majority do not seem to hold the view that Dr. Wood used to and still does so strongly impress, viz. "that the point of the syringe must be

* *Traité des Nevralgies*, 1841.

† *Med. Times and Gazette*, 1858.

put into the spot where you find you can awaken the pain upon pressure;”* but for the most part employ it in the painful limb, with a kind of tacit belief that of course it must do more good being injected nearer than elsewhere.† Like Dr. La Sègue, they do not think to try the distant injection themselves.

In the case of muscular paralysis, the general belief is that injections act better localised to the paralysed muscles themselves. Now I have somewhat extensively employed both local and distant injections. I am not going to affirm that those practised at a distance are more effectual than those practised locally, nor to deny that sometimes the latter are followed by more complete relief than when the former are employed; but having been the means of many diseases being first treated and cured by the distant injection—diseases in which localisation was out of the question (*e. g.* tetanus, delirium tremens, &c.)—the *modus operandi* of subcutaneous injections becomes an interesting object of inquiry; and also the extent to which we may give localisation the credit for the good which results in neuralgic cases.

Behier, called by Jousset‡ the ‘*vulgarisateur*’ of this method abroad, in that “he was the first to draw the attention of the French practitioners to the marvellous results of this new method,”§ in the same communication disputed my assertion concerning the equal value of distant injections. But his observations were made with strychnine, and by injection into *the muscles themselves*, in cases of paralysis. Such injections I had never then practised, having always as a rule preferred the loose cellular tissue as the site to receive the injection, rather than to inject into a contractile tissue.

Dr. Rappaner of Boston, in his last work on this subject, says: “I have attempted, in order to verify Mr. Ch. Hunter’s opinion, to perform injections in a region remote from the seat of pain without ever having obtained any decided result.” But in a note accompanying his present of the work to me

* Brit. Med. Jour. 1858; Med. Times and Gaz., 1865, p. 637.

† De la Méthode Hypodermique, par Jousset (de Bellesme), 1865.

‡ Bulletin de Thérapeutique, 1859, Paris.

§ Rappaner on Hypodermic Injections, 1865, Boston.

he says: "And although we differ for the present on some points as to the localisation of the treatment, yet recent experiments have convinced me that I shall have to modify my statements somewhat in that respect. Time will bring us nearer together."

Doctors Mitchell, Keen, and Morehouse, also of America, and who have written a special report upon the hypodermic method, allow that "the opinion of many good observers is quite decided as to the fact that the injection gives the same relief whether made near to or remote from the seat of pain. We may therefore be asked," say they, "why we made so many injections in the same limb or neighbourhood? One answer lies in the fact that our patients very early, and we ourselves later and more reluctantly, reached the conclusion that the point at which the injection was to be employed was not a matter of indifference.

"In the *milder* instances of neuralgia a subdermal injection of morphia *used any where in the body* did give relief; but in the cases of 'burning neuralgia,' the nearer we could bring the agent to the place where the pain was felt, the greater was the ease obtained."*

This conclusion must sound rather curiously to those who regard the first and chief effect to be on the part, and the excess upon the system at large.

I feel the less inclined to yield to the decision on that point, as those authors state that, "after repeated trials of conia, *atropia*, and elaterium, with the intention of relieving pain by their subdermal use, we ceased to resort to them." That *atropia* should be thus condemned seems to me evidence that their alkaloid was inert, or not used in appropriate cases; for, next to morphia, I know of no drug more valuable for "subdermal" use.

Mr. Charles Moore, of the Middlesex Hospital, who has had great experience in this treatment, thus remarks upon the localisation: "He had also convinced himself that the action of morphia he thus injected was not local only, *nor even chiefly local*, but general."†

* American Jour. Med. Science, July 1865.

† Discussion following my paper at the Royal Medical and Chirurgical Society,—Med. Times and Gazette, June 3, 1865.

Such has been my own opinion for many years; and in that these injections have so great a *general* effect is in part, as it appears to me, one great reason of the good that results from them. I cannot attribute the greater benefit which attends their use over the administration of medicines *by the mouth* to the localisation of the injection to the painful part; but I attribute the greater benefit to the difference of the tissue from which the alkaloid is absorbed. For whilst the medicine administered by the mouth is subject to the same influences to which food so administered is subject, the medicine placed by the syringe in the loose cellular tissue is taken, I maintain, into the circulation with rapidity, it is absorbed in its purity, and is distributed through the system with unerring certainty.

To the question, then :

Is localisation of the injection to the neighbourhood of the painful nerve either necessary or superior to the distant injection for benefit to accrue?

I reply, neither necessary nor superior to the distant injection in the majority of cases, according to the evidence furnished me by many thousand injections.* I have often had cases of facial neuralgia in which a painful spot existed, and in which I could excite the paroxysm by pressure. The injection in the arm has usually at once relieved, and after a few injections cured, such a case.

I have no space permitted me to detail cases here; I will therefore refer the reader to pages 11, 12, 42, 52, &c. of my memoir on this subject,† in which I detail obstinate cases both of *tic douloureux* and of *sciatica*—cases for which the French critic (*Archives Générales*) says, “the injections along the course of the nerve have been especially recommended;” but which, to his astonishment, I rapidly cured by the injection IN THE ARM.

An impartial answer to the following questions will, I think, help to explain away one’s doubts as to the necessity for localisation :

* I do not here speak of patients—for in many patients I have made over 100 of these punctures, at times locally, but usually at a distance from the part affected—but of separate punctures on the human being.

† On the Speedy Relief of Pain by the Hypodermic Method. Churchill, 1865.

1. What is implied by localisation? Does it mean that the anodyne drop should be brought by the syringe into actual contact with the nerve itself, or that it need simply repose somewhere in its neighbourhood?

2. Are not remote parts of the nervous system likewise affected by the injection, as well as the painful part?

3. Do not the absorbents or the veins take up the injected drop at once?

4. Is the *chief* effect of that drop upon the vicinity of the injected point?

5. Is a smaller local injection more effectual than a larger remote one?

These questions can only be answered by considering the *modus operandi* of hypodermic injections.

The first localiser—the originator of the local injection, Dr. Wood—says little in his reply to this question, really in favour of the theory he still maintains.

“It would,” says he, “be a sad puzzle to many of us, I suspect, if we were asked how many other remedies, which we use, act. We know the effect they produce, but often we are unable to tell why it is so. I believe the remedy acts in two ways: first, the injection into the cellular tissue *in the neighbourhood* of the nerve, the needle being charged with the narcotic solution, affects the nerve; in the second place, I believe it acts by being passed into a part which rapidly absorbs the medicine and sends it through the system, thus producing an almost instantaneous effect.”*

And that is all that can be said of the local effect, that, being in its neighbourhood, “it affects the nerve”!

I know prejudice is still very strong in favour of local injections; but I would ask the question—having cured so many cases by the *remote* injection—whether this “rapid absorption,” which is allowed to exist by Dr. Wood, and is placed by him in the second place, does not rather deserve *the first place*?

Of the general effects of the local injection there can be no possible doubt. “It is truly astonishing,” says even Dr. Wood, “to see how rapidly it affects the system. If you throw in a

* Brit. Med. Jour., Aug. 28, 1858.

large quantity, you will see the eyes immediately injected and the patient narcotised; and in a few minutes afterwards you will see him in a profound sleep.”*

Is all this produced through nervous communication, or through general absorption? There can be no doubt it is the latter, in that the heart and the pulse are always influenced before any decided effect is manifested upon the pain. That it is absorbed, the recent observations of Dr. Thompson establish, as in a few minutes he detects iodide of potassium in the urine. It is further proved in that you can, by arresting the absorption—as Claude Bernard has done in dogs, after injecting curari—arrest also the effect of that poison on the system. The dose can thus, by a ligature or a ring around the injected site, be delayed in its action at the will of the operator.

I used frequently, when house-surgeon, to observe the rapidity of these general systemic effects; for, after having administered the morphine injection to perhaps five or six patients, upon repassing through the wards most of them would already be asleep. What is the deduction to be drawn?† Is it not that if these distant effects can be so rapidly and so surely produced, that the drug is absorbed? Then why not give this general absorption the first place? Where is the need to localise, if distant effects are at the same time so powerfully produced? If absorption is so rapid, *little* can remain for the production of local effects. One would almost imagine that the localisers were not aware of these distant, these universal phenomena, attending the injection; and that they held the view that the injected drop, limited as to its *chief action*, radiated anodyne ripples through the neuralgic tissue, soothing and curing the disease by waves excentric from the neuralgic focus.

That direct contact of the injected drop with the nerve is necessary, I deny; nor is it deemed necessary by many who think that if it is just put into the neighbourhood, it is sufficient; trusting, I suppose, to the local-radiation theory. But, as much fat and fascia, especially in sciatica, usually inter-

* Brit. Med. Jour. Aug. 28, 1858.

† Dr. Williams found it send a lady asleep in about five minutes, whilst stomachic anodynes had for days previously failed.

venes between the spot where the anodyne is deposited and the affected nerve, I consider in such a case the action as due to general absorption.

4. Is the chief effect upon the surroundings of the injected spot? Here "commentators differ." I have shown that all admit a general absorption, and that such absorption is very rapid; but are special extra effects produced upon the injected spot? Let me separate this question from the local effects of topical cutaneous applications, such as lotions, embrocations, &c.

I believe such topical applications to differ, for the most part, as to their mode of action from the injected dose. I do not deny that the effect of a poultice is upon the part to which it is applied, or of hot fomentations, or of anodyne lotions, or of opiate embrocations. When these are employed, absorption into the general circulation is but slight; for the narcotising substance is brought in a liquid form into contact with innumerable terminal filaments of nerves, which are benumbed *before* sufficient can, in most cases, be absorbed to affect the system in any marked degree.

On the other hand, the injected anodyne is contained in but one or two drops of liquid; it is not brought into contact with any amount of nervous filaments; it is beneath all the terminal ramifications of the nerves; it is in a tissue from which it can be rapidly absorbed; and that it is so we know, —1st, because of the distant phenomena that it produces; and 2dly, because you can cure neuralgia by the remote injection. It has hardly time to throw a narcotic halo round about before the absorbents pounce upon it and atomically distribute it throughout the whole system. The editor of the *Archives Générales* has not incorrectly hit upon my idea when he says, "according to Mr. Hunter there is no need to practise the puncture *loco dolenti*. The substance, once insinuated into the cellular tissue, disperses; it belongs to the general circulation, and its *therapeutical localisation is secondary*."

But there are at times certain local effects produced by the injection on the nerves of the part. They are: 1st, an increased sensitiveness of the skin of the part; 2dly, a dull numbness of the skin of the part. These phenomena only occur, as a rule, after *repeated punctures* about or near the same spot.

The former condition is perhaps the more frequent of the two. It has been observed by Messrs. Mitchell, Keen, and Morehouse, as well as by myself. The latter may last for several weeks, the part being less sensitive to ordinary impressions than the adjacent parts.

There is another question not without importance in favour of the non-necessity for localisation. It concerns the nature and origin of neuralgia. Is neuralgia a local disease? Does a local cause exist at the part where the paroxysm occurs?

As a rule, these questions should be negatively answered. Brow-ague may be looked on as a local affection of the forehead; but it is only a *reflected* and *symptomatic* affection, and it is cured by that treatment which corrects the state of the stomach. As a rule, no local proximate cause exists at the part affected by the pain. Watch any case of neuralgia; see how the pain shifts from branch to branch of such a nerve as the fifth cranial. The paroxysm attacks the jaw to-day, the scalp to-morrow, and leaving the trifacial, attacks some other nerve the following day. The local puncture may drive it from place to place; the remote puncture, if insufficient to cure, may equally affect its site.

Does not this show that a general neuralgic diathesis or disposition exists in such cases? I look upon neuralgia of a nerve from disease or irritation of a directly local origin to be less common than

(1) When due to a morbid susceptibility of the nervous system, apt to be influenced by malaria, cold, damp, or other causes affecting the system generally; or than (2) when due to a morbid state of the secretions of the blood, kidneys, uterus, &c.; or than (3) when due to some directly-exciting cause, by reflex irritation affecting some other nerve, as of hemi-cranial neuralgia from dental caries.

If such is the case, I think we may understand how it is that the remote injection, as usually practised by myself, may be as beneficial as the injection made into those points at which the neuralgia has, for the time being, more particularly attacked. If it is a mild case of neuralgia, it is allowed by Messrs. Mitchell, Keen, and Morehouse, that the distant equally with the local injection will cure the disease. Take

this statement with the fact that neuralgia is constantly shifting its locality, and it may then be allowed that a general neuralgic diathesis exists in patients affected with neuralgic paroxysms.

Neuralgia directly due to local irritation or disease at the painful part is, I take it, rather the exception. It is far more frequent to find neuralgic paroxysms due—(1) to a nervous diathesis, acted upon by malaria or cold or damp or shock, &c.; (2) to a morbid state of the secretions of the blood, the skin, &c.; or (3) to some exciting cause not at the part affected by the pain, but of some other nerve, the neuralgia being induced by reflex irritation.

If the causes, both predisposing and exciting, of neuralgia are *generally of a nature to affect the whole system*, we may begin to understand how it is, not only that the distant injection, as usually practised by myself, is quite as beneficial as when employed locally upon those points *for the time* affected by the paroxysm, but how also to cure the disease something more than the mere local influence is required. If reflex irritation from some other nerve has caused the paroxysm, the true cause is distant, and the remote injection is as likely to cure as that localised to the seat of pain. If a neuralgic diathesis is the cause, the remote is certainly as likely; for the injected agent is rapidly absorbed, and pervades every part of the system. Such being the case, how far greater is the chance of permanent good being produced by the hypodermic injection, than if the anodyne remained only in, or affected only the part injected, or could cure only by such localisation as the syringe imperfectly effects.

It is curious that Valleix, who so much studied the cause and treatment of neuralgia, had little faith in the curative powers of narcotics for that disease. Under the head of "Internal medication for neuralgia in general," he says:

"Narcotics have generally been employed, it may be to assist, it may be as the principal means in nearly every case of neuralgia. However, I have *not* established a single well-marked cure by this treatment."*

How different is the evidence furnished by the hypodermic use of the narcotic, compared with the experience

* *Traité des Névralgies*, 1841.

of Valleix, as to its stomachic use. "The hypodermic method has now," as Jousset observes,* "spread rapidly in the medical world; and it has entered into the current practice of the majority of medical men. MM. Courty de Montpellier, Voillemier, Gubler, Lailler, Montard-Matin, &c. &c. have successively studied it; and there are few practitioners to-day who do not employ subcutaneous injections," and who have not cured neuralgia by narcotics alone when thus employed.

These, and others who have at all studied the subject, would, I doubt not, have no hesitation in admitting the *curative* powers of morphia thus administered, even in cases that morphia could only palliate when given by the mouth.

In a few words, let me then resume: (1) medicines may produce their effects topically applied, or when taken into the general circulation; (2) medicines topically applied need not produce any appreciable effect upon the system, although having a local effect; (3) this will be partly due to the nature of the tissue to which the agent is applied, and partly to the power of the absorbents to take the agent into the circulation.

Thus atropine is with difficulty absorbed through the cutis vera when covered with epithelium;† but no medicine is perhaps more quickly absorbed from the areolar tissue beneath the skin. Aconite will locally benumb the cutaneous filaments, and topically relieve neuralgia before sufficient of it can be absorbed to produce general physiological effects. But, as Bernard says, if the stomach is only in sufficiently an empty state, curari may be absorbed and produce effects upon the system; so atropine and aconite, long enough applied to the skin, will get into the circulation, and, as I have witnessed in the case of aconite, produce poisonous results.

Hypodermic injections into the areolar tissue act differently. The injected fluid is rapidly absorbed; distant parts, equally with the part injected, bow to the action of the drug. There is proof that the circulation is affected before the pain is relieved. There is no proof that more effect is produced upon the injected part than upon distant parts. There is proof that distant injections will cure neuralgia, cause

* Loc. cit.

† Dr. Parisol has made some interesting remarks, showing how little, if at all, atropine is absorbed through the skin,—Comptes Rendus, 1865.

sleep, and give power to the muscles of the one arm although injected into the other.

The critic in the *Archives Générales* says: "Pushing still further the theory of Mr. Hunter, we ought to admit that the hypodermic method enjoys a special efficacy when the puncture is made distant and very far from the painful spot."

This is pushing my theory a little too far; but my critic can hardly believe in the cases of sciatica being so successfully treated by the injection in the arm. If a better result in sciatica does follow the injection in the arm than in the thigh, it is because the tissue of the arm is loose, and more favourably disposed for rapidly absorbing the drug than the tissue of the thigh (having perhaps fewer absorbents, and being loaded with fat) may happen to be.

Notwithstanding the strong current of opinion still in favour of localisation, I must venture to differ from those who advocate its necessity, as long as I find: (1) that local injections do *more than* affect the part injected; (2) that the absorption of the injected drop is exceedingly rapid; (3) that the effect of local injections is usually seen upon the pulse *before* the local pain is relieved; (4) that distant injections have, with some experimenters, as a rule, been always equally effectual with local injections;* (5) that in the case of atropine, whether the injected dose happens to be one-tenth or one-hundredth of a grain, the remote phenomena are always produced as quickly as the local; and lastly, because I find deep-seated pain and affections of the nervous centres to be as amenable to this kind of treatment as local superficial neuralgia.

* In a most interesting paper on Functional Nervous Affections I see that Dr. Brown-Séquard fully corroborates my views. "I have ascertained," says he, "that a subcutaneous injection can be as useful when made at a great distance from the place of a pain (whether neuralgic or inflammatory) as when made on that very place. Even in cases of traumatic neuralgia I have seen, as Dr. Mason Warren has before me, that distant injections can be as good as local injections. Still, although agreeing thus far with Mr. C. Hunter, I would recommend local injections in the cellular tissue round the sheath of a superficial nerve in cases of tetanus, hydrophobia, and epilepsy." *Lancet*, March 10, 1866.

CHARLES HUNTER.

XV. ON CONGENITAL DISLOCATIONS OF THE FEMUR.

SEVERAL instances of congenital dislocation of the head of the thigh-bone have been presented to my notice at the hospital during the last two years; and I am thus glad of this occasion to make some observations on the subject.

The dislocations which are for the most part met with at birth are those of the head of the thigh-bone. They occur in three directions: namely, upwards and outwards, directly upwards, and upwards and forwards. But although these several varieties of luxation occur, the first mentioned, that namely upwards and outwards, is the one usually met with; and it is that which has alone been remarked at the hospital. The other varieties of dislocation of the head of the femur—directly upwards, and upwards and forwards, as well as other congenital dislocations, such as those of the shoulder, elbow, jaw, &c.—are in fact only seen together with foetal monstrosities, or they exist as results of partial paralysis, or through alterations of the articular surfaces; and they are subluxations rather than true dislocations.

Dislocations, then, of the head of the thigh-bone upwards and outwards on to the dorsum of the ilium occur generally as double luxations; and they are seen more frequently in the female sex than in the male. Except in one instance among the cases now referred to, both limbs were dislocated. Only one male was affected, and he was received into the wards of the hospital, that those who desired to do so might study this form of dislocation; for the peculiarities of the dislocation and its results were very strongly marked, and calculated to produce a vivid impression. The boy was twelve years of age and muscular. Both limbs were dislocated. The

trochanters projected abnormally, and approached nearer to the crests of the ilia than in their natural condition, and the heads of the thigh-bones could be seen projecting on the ilia beneath the glutei. The pelvis was thus rendered very oblique, the sacrum being raised and the pubes carried backwards, while the lumbar and lower dorsal vertebræ were much curved forward, rendering the abdomen protuberant. The knees were directed inwards, and the feet were flat; the lower limbs were weak and wanting in muscular power, and unequal in development to the rest of the body. The muscles of the arms and of the upper part of the trunk were well developed, and they were largely used in progression.

All the peculiarities of this dislocation are exaggerated when the patient is standing, and especially in walking; while, on the other hand, they are much diminished in the recumbent posture. It is for this reason that congenital dislocation of the femur is seldom noticed until the child begins to walk alone; then the peculiar rolling gait attracts attention.

At birth, the acetabulum and the head of the femur retain their normal characters; and when it is recognised, the dislocation at this time will be reduced by gently extending and flexing the limb. But after some months changes occur: absorption of the cartilaginous surfaces takes place; and ultimately the head of the bone loses its cartilage, and becomes irregular in form. These changes go on very slowly, however, so that the integrity of the cartilaginous surfaces is retained almost complete, in some instances until the end of the second year.*

The cartilaginous lip of the cotyloid cavity becomes absorbed quickly, and important changes take place in it more rapidly than in the head of the bone. Consequently the

* It is beyond doubt that this dislocation is produced at birth through downward force applied to the thigh in endeavouring to hasten the birth in breech presentations. A slight click is heard while pressure is being applied, and at the same moment the head of the bone passes out of the acetabulum. It is probable that spasmodic muscular action may produce a similar effect; but this also occurs at birth in all probability, and not *in utero*. I lately saw a family of three children, one of whom had congenital dislocation of the right femur; another had congenital dislocation of the left femur and congenital talipes varus; and the third suffered from congenital dislocation of the heads of both thigh-bones.

head of the femur may be drawn down into the acetabulum, but it is difficult to fix it there. The means of retention are diminished; and the muscles which are inserted into the trochanter being contracted, tend to displace again immediately the head of the bone. These considerations induced me to propose the subcutaneous section of the muscles which are inserted into the trochanter, and subsequently to draw down the head of the femur and fix it in the acetabulum. This operation is easily accomplished, and its success is complete.

On the 21st of March 1865, I performed this operation. I had been consulted by Mr. Herbert Barnes respecting a case of congenital dislocation of the head of the femur some months previously, when I proposed the operation to which allusion has been made; but it was not at first acceded to. Extension was therefore employed for many months, but without any real advantage being gained; and consequently it was determined to resort to operation.

With the assistance of my friend and colleague, Mr. Holmes, I divided all the muscles which are inserted into and about the trochanters, especially the glutei and the rotators. The head of the femur was then drawn down to the acetabulum, and it was found that it remained in that position, and that there was no disposition to displacement. The limb was bandaged to a straight thigh-splint, and sufficient extension was employed to keep the head of the femur in contact with the acetabulum. This was easily effected, there being no disposition to retraction. In two months after the operation consolidation had advanced about the head of the bone so thoroughly that there was no disposition for the head of the bone to escape, but it remained perfectly *in situ* while passive motion was employed. The natural motion of the hip-joint was imitated daily for a month, and the child was then allowed to walk with an instrument, which was so contrived as to prevent the escape of the head of the bone from the acetabulum, but which allowed the movements of the limb to be free. This instrument was worn during the day for six months. After this time it was not worn constantly; and at the end of twelve months it was discontinued. At that time the child walked strongly and without limping; and indeed there was scarcely any peculiarity of gait. She required no other assistance than a thickened sole to her boot, to the extent of about one-eighth of an inch, to enable her to walk well.

This case has induced me to propose a similar operation in other cases of a like kind.

In children under two years of age it will probably not be necessary to have recourse to this operation. Through extension alone the head of the femur may be restored to

and retained in the acetabulum; but after this age there is great difficulty in preventing the escape of the bone from the cavity; and consequently, if it cannot be otherwise accomplished, subcutaneous section may be had recourse to. I expected to find that considerable muscular weakness would result from the section of the tendons and muscles about the neck of the femur, but this was not so; and I was much gratified to see the child walk easily and firmly before the instrument which was worn for support was finally discarded.

If, then, the head of the femur can be drawn down to the acetabulum, but cannot be there retained, it is justifiable to divide the muscular and tendinous structures which have been above indicated, and to fix the head of the femur upon the acetabulum; and this operation may be performed at any age prior to the formation of a new joint on the dorsum ilii.

B. E. BRODHURST.

XVI. ON THE DIURNAL VARIATIONS IN THE TEMPERATURE OF THE HUMAN BODY IN HEALTH.

(1) THE importance of the thermometer as an instrument in the diagnosis and prognosis of disease is becoming more and more apparent. It is very desirable, therefore, no less in a medical than in a physiological point of view, that the fluctuations of temperature which occur in the healthy body, and the conditions on which they depend, should be carefully investigated. For until this has been done the physician possesses no standard with which he may compare the abnormal fluctuations of disease.

In this paper I hope to contribute some data towards the establishment of such a standard. In it will be found a series of observations on the variations of temperature which occur in the course of the day, and also some further observations made in order to ascertain the causes of these fluctuations.

(2) It should be stated that two similar series of observations, continued for much longer periods, have been already made by a distinguished physiologist—Dr. John Davy—and have been published in the *Philosophical Transactions* for 1845 and 1850. It will be seen that the results at which I have arrived differ considerably from those of Dr. Davy. This may be in part owing to some difference in the constitution and the age of the subjects of the observations, or may depend on differences in their modes of life. But I must also point out that Dr. Davy's papers contain such numerous

and such serious arithmetical blunders that his results are really without value.

As these results are quoted as authoritative in all our physiological text-books, it is necessary to substantiate this statement as to their value.

Dr. Davy took his temperature three times a-day during eight months in England, and during no less than thirty-six months in Barbadoes. At the end of each month averages were drawn from the daily recorded observations; and at the end of each period—that in England and that in Barbadoes—averages were again struck from the monthly results. The figures thus obtained were these:

Mean Temperature under Tongue.

In England.			In Barbadoes.		
7-8 A.M.	3-4 P.M.	12 P.M.	6-7 A.M.	12-2 P.M.	9-11 P.M.
deg.	deg.	deg.	deg.	deg.	deg.
98·74	98·52	97·92	98·07	98·9	99

There is thus the most extraordinary contrast between the results in England and in Barbadoes—the temperature of the body in the one climate sinking from morning till night, and in the other as constantly rising.

But in reality much of this apparent contrast is due to an arithmetical error, as any one may see by a glance at the table of monthly averages at p. 44, *Physiological Researches*.* Admitting these, for the present, to be struck accurately, the general average struck from them is calculated wrongly. The temperature for the evening in Barbadoes should be 98·775 instead of 99; that is, there is actually a fall instead of a rise when the evening is compared with the midday; and thus the contrast in this respect between the results in England and those in Barbadoes vanishes. But this is not all. Not only is the general average thus faultily struck, but the

* The papers, which appeared originally in the *Phil. Transactions*, have been republished by Dr. Davy in his *Phys. Researches*, 1863. I have compared the figures in the two publications, and they are identical.

monthly averages, on which it is based, are also full of errors; and as ill-luck would have it these errors are almost entirely in the same direction as the error already pointed out, that is, they make the midday temperature lower than it should be, and the evening temperature higher.

Thus the midday temperature for

November 1845	is set down as	98·6	instead of	98·77
April 1846	„	98·7	„	98·88
July 1846	„	99	„	98·85
November 1847	„	98·8	„	98·87
July 1848	„	98·3	„	98·86

and the evening temperature for

May*	1846	„	98·9	„	98·8
October	1846	„	99	„	98·9
October	1847	„	99	„	98·7

All these errors, it will be noticed, with the exception of that for July 1846, are in the same direction, and add to the still greater error in the general average already pointed out.

The monthly averages for the English period are just as faulty, and here also the mistakes are all on one side. No less than three out of eight monthly midday averages are struck too low. For

August is given	.	98·5	instead of	98·58
December	.	98·2	„	98·32
January	:	98·07	„	98·73

It is quite plain that Dr. Davy's results, vitiated as they are by all these serious errors, must be rejected as without value.

(3) The observations now to be given were all made with the same thermometer, a delicate maximum self-registering instrument. The temperature was taken under the tongue, with the following precautions. The bulb was first warmed in the hand till the mercury rose to within a degree or so of the known natural warmth of the body. Thus any error from the cooling of the mouth by the cold instrument was avoided. The bulb was then introduced as far back as

* This error is not in the calculation of the average, but the wrong number is carried over to the table in p. 44 from p. 63.

possible under the tongue, and retained there for seven or eight minutes, the mouth being kept closed during this time and respiration carried on entirely through the nostrils. The temperature of the mouth taken in this way is the same as that of the urine, as I have found on repeated trials. It may, therefore, be fairly considered to represent the general temperature of the internal organs.

(4) The observations were made on two persons in good health—man and wife; on persons, therefore, living in most respects under precisely the same external conditions, the one, however, naturally taking more exercise and more food than the other.

The general manner of living was this. A substantial breakfast was eaten at about 9 A.M.; a light lunch at 3 P.M.; dinner, with a fair allowance of wine, at 7.30 P.M.; and nothing after this. To bed about 1 A.M. Rather more than the average amount of exercise of Londoners was taken, and this in the afternoon. But when any violent exertion had been made, or when exercise had been at all excessive, no observation of temperature was recorded, or rather, such observations were kept separate from the rest. The same rule was observed in the case of any other departure from the ordinary mode of life, such as unusual amount of food or of wine, or their consumption at unusual hours.

The temperature of the air was noted at the same time as that of the body; and for one of the two subjects, the pulse also. I have not thought it worth while to print all these observations in detail; but the monthly averages for the pulse and for the external temperature will be found at the end of this paper in company with the daily observations of the temperature of the mouth.

The day observations were taken during the summer, the night ones during the winter. But this need not prevent us from putting the two sets together, and forming from them one continuous curve for the twenty-four hours; for it will be seen that season is of no importance, or of very little. The temperature of the body on going to bed, and again on getting up, is within one-tenth of a degree as high in winter as it is in summer.

(5) (α) Mean monthly results during Day-time.

MAN.

Time.	Before breakfast.	11 A.M. 2 P.M.	3 P.M. 5 P.M.	6.30 P.M. 7.30 P.M.	9 P.M. 10 P.M.	12 P.M. 12.30 A.M.
First month .	97·7	98·2	98·4	98·5	98	98
Second month	97·8	98·2	98·4	98·6	. .	97·9
Third month .	97·7	98·2	98·3	98·8	. .	98
	97·73	98·2	98·36	98·63	98	97·96

(β) Mean results during Night-time.

MAN.

12.30 A.M. 1 A.M.	3 A.M. 5 A.M.	5.30 A.M. 6.30 A.M.	8 A.M. 9 A.M.
97·9	97·5	97·2	97·655

(γ) Mean monthly results during Day-time.

WOMAN.

Time.	Before breakfast.	11 A.M. 2 P.M.	3 P.M. 5 P.M.	6.30 P.M. 7.30 P.M.	9 P.M. 10 P.M.	12 P.M. 12.30 A.M.
First month .	98	98·5	98·8	98·6	98·4	98
Second month	98	98·6	98·7	98·6	98·55	98
Third month .	98	98·6	98·75	98·6	98·4	98
	98	98·56	98·75	98·6	98·45	98

These results will perhaps be more readily appreciated by the eye when presented to it in the form of diagrams. I have therefore arranged them in the following manner :

Diagram 1.—Diurnal Fluctuations,—MAN.
Day and Night.

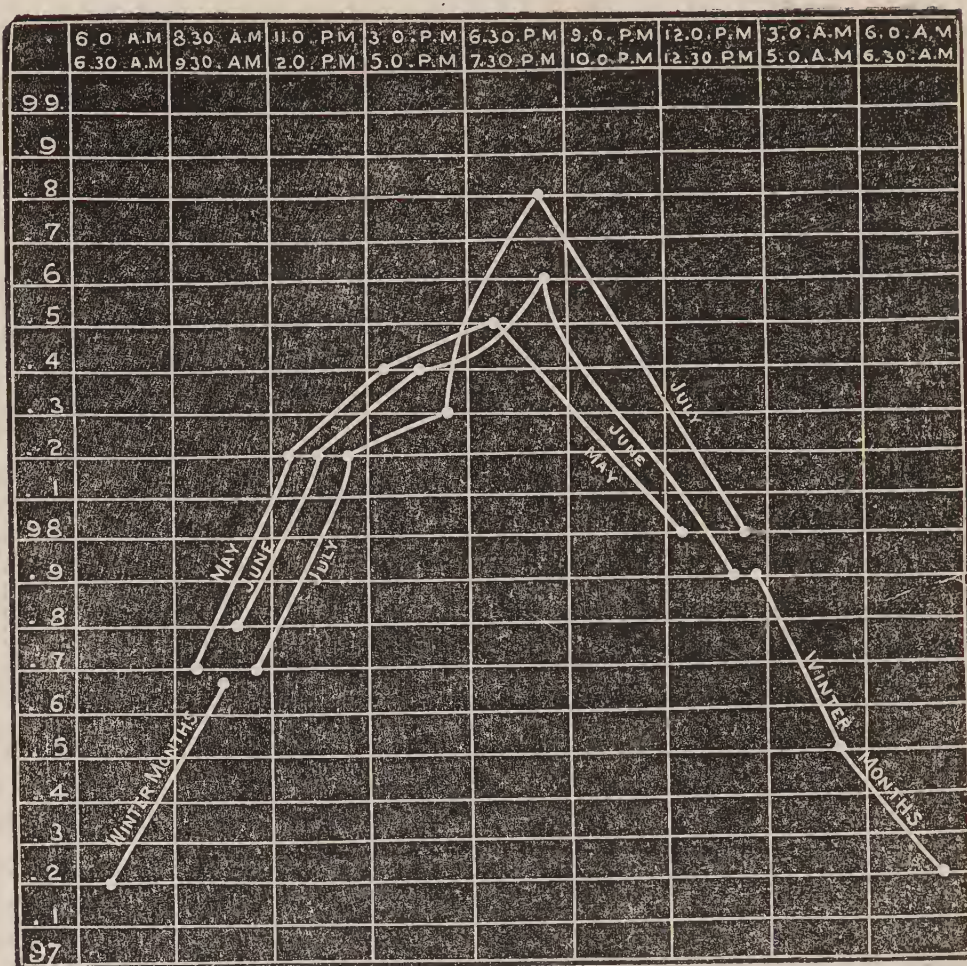
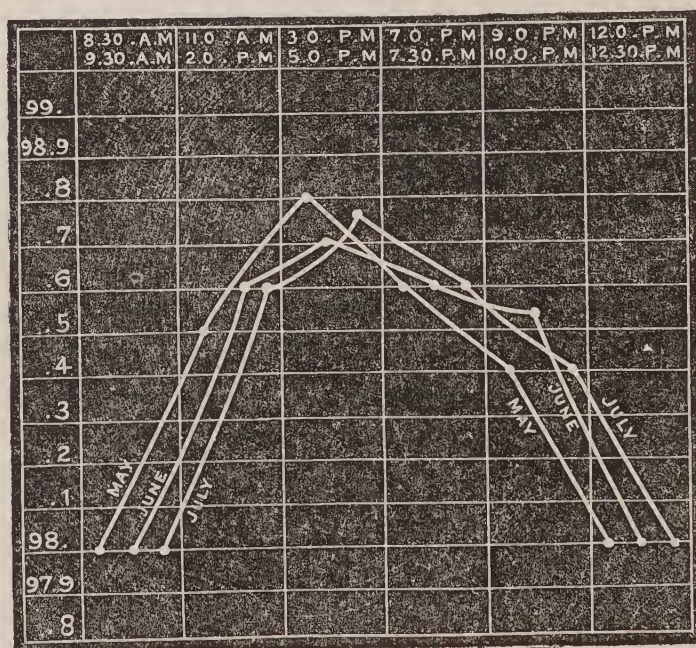


Diagram 2.—Diurnal Fluctuations.—WOMAN.
Day only.



(6) That these averages are not mere accidental results based on an insufficient number of observations, but really represent with accuracy the normal fluctuations which occur daily under such conditions of life as I have described, may, I think, be assumed from the following considerations: First, the monthly averages tally very closely with the observations of any individual day, as will be at once seen by any one who examines the records at the end of this paper. Secondly, the results of the several months agree in a very remarkable degree with each other. Thirdly, the differences in the results furnished by the two subjects of observation in the first month are repeated without exception in the two following months. Thus, in one person the maximum heat was attained at an earlier period in the day than was the case with the other; and this peculiarity recurs each time. So in one person the morning temperature was considerably higher than in the other, and this difference is repeated in each of the three months.

In both cases, however, the essential features are the same. In both we see a rise from morning till late in the afternoon, and in both a fall after this to bedtime.

The night observations after this time were only made on one person, as shown in the diagrams; but combining these with the day results, we arrive at the following conclusions.

The lowest temperature of the body occurs about daybreak. At this time a rise begins, which continues till late in the afternoon, reaching its maximum at different hours in different persons, for reasons to be presently considered. The maximum reached, the temperature again falls. The fall is at first slow,* but becomes more rapid after nine or ten o'clock; and this fall continues till daybreak or thereabouts, when the cycle begins again.

The average variation in the course of 24 hours is about $1\frac{1}{2}^{\circ}$ Fahr. The minimum temperature which I have observed in my own case was 97° . This was at 5.30 A.M. on a winter's morning. The maximum observed was 100.6° . To this temperature I rose once in a Turkish bath. I have

* This statement as to the varying rate of the evening fall is based on the observations pictured in Diagram 2. It will be seen hereafter that it is only true when no wine or very little wine is taken with dinner.

taken my temperature many hundred times at all hours, day and night, and have never found it above or below these extremes. I infer, therefore, that the range within which the temperature oscillates in health is not of greater extent than $3\frac{1}{2}^{\circ}$.

(7) It remains to consider the conditions on which these daily fluctuations depend. Food, exercise, external temperature, at once suggest themselves as the most probable agents. But it is quite evident that no one of these, nor combination of them, can account for all the oscillations. The rise which occurs in the early morning is clearly independent of them all. It cannot be due to food or exercise, for it takes place while the body is still in perfect repose, and when no food has been taken for ten or twelve hours. Neither is it attributable to a change in the external temperature; for I found that the average rise in this, between 5.30 A.M. and 8.30 A.M., was no more than one degree in my bedroom; and this small change in the external medium is quite insufficient to account for a rise of $\frac{1}{2}^{\circ}$ in the body, as I shall show when I come to speak of the effects of external warmth. Moreover the oscillation in question occurs even when the external temperature varies in the contrary direction. Thus on one occasion I noticed that the temperature of my room fell from 54 to 52 in the interval between 6 A.M. and 8.30 A.M.; yet in that time the temperature of my body rose from 97.2 to 97.8, and this though I had slept soundly.

To what, then, can this unfailing morning rise be ascribed? Doubtless it is immediately due to increased chemical change; for coincidently with the rise there is also increase in the exhalation of carbonic acid.* But this is only altering the form of the question. To what is the increased chemical change due?

It appeared possible to me, seeing that the change takes place at daybreak or thereabouts, that it might be due to the stimulus of light. This hypothesis would have squared well with several ascertained facts. Thus it would have tallied admirably with the phenomena observed by Dutrochet in plants. A plant during the night is in a state of inactivity;

* There is also an increase in the amount of urea excreted, as Dr. E. Smith has shown. *Proc. of Roy. Soc.*, May 30, 1861.

the chemical changes within it are suspended, and its temperature is that of the surrounding medium. At daybreak a change occurs: the arrested chemical processes are again set in motion, and the temperature of the plant begins to rise. The elevation increases as the sun mounts higher above the horizon, and reaches its maximum at an hour which varies in different plants from noon to 3 P.M.; then a gradual cooling sets in, which continues till night, when the plant's warmth is found to have again sunk to the level of that of the surrounding air.* There is thus in a plant, as in a man, a daily rise and fall of temperature; and in both the rise begins at the same time, namely, about daybreak. Now in the plant this rise is due to the action of light; for if the plant be kept in perfect darkness, the rise is for one or two days much less decided, and then entirely ceases.

It appeared not impossible that the same cause which is thus efficacious in the case of plants might also produce the corresponding phenomena in animals and in men; and this hypothesis was rendered still more probable by a fact observed by Moleschott, namely, that frogs exposed to the light give off considerably more carbonic acid than when kept in the dark, all other conditions being the same. (Funke, *Lehrbuch der Phys.* i. 454.)

This plausible hypothesis, however, failed me when subjected to experiment. Clearly if the rise were due to light, the exclusion of light should put a stop to it, if not at once, yet when a sufficient time had elapsed for the acquired periodic habit to pass away. Such, however, I did not find to be the case. For eight successive weeks I kept the shutters of the room in which I slept closely fastened, so that no light reached me till after 8.30 A.M.; yet the morning rise took place as before, and with undiminished intensity.† The morning rise would seem, then, to be independent of light; and some other explanation must be found.

I would suggest that it may be due to a diminution in

* This is not true of all plants, but of most. There are some which even at night preserve a higher temperature than that of the air: such, for instance, is the case with *Cactus flagelliformis*.

† In the table at the end of this paper the night-observations for January and February were made with the shutters open, those for March and April with the shutters closed.

the intensity of sleep as morning approaches. The first sleep is the most profound. In it not only are the animal functions suspended, but to a certain extent those also of organic life. The latter are rested sooner than the former, and resume their full activity while these are still slumbering. This awakening of the organic functions occurs about daybreak, and manifests itself by quickening of the pulse, increased exhalation of carbonic acid, and consequent rise of temperature.

If this hypothesis were true, then we should expect that when once the whole system is thoroughly awake the maximum temperature due to this cause would be reached, and would be maintained without change so long as that condition of wakefulness existed, unless some other disturbing influence—food, for instance, or exercise—came into play. And such is really the case, as the following observation shows: On July 6, 1866, I took the temperature under my tongue at 8 A.M. in bed: it was 97·6. I remained four hours longer in bed, awake, but perfectly quiet, and without food. Each hour I took my temperature: it remained the whole period without change, at 97·6; and only when I rose and exercise began to influence it did it vary. The rise, then, which takes place between 6 A.M. and 8 A.M. is due to some influence the action of which is stationary and equable after 8 A.M.; and such is the influence I have suggested.

(8) I pass on now to the consideration of the causes of fluctuation already mentioned. I will begin with “the effects produced by changes in the external temperature.”

The temperature under the tongue rises and falls to a certain extent with that of the external medium, as the following observations show:

Exp. 1. On May 10th, 1865, the external temperature being 57 and the temperature under my tongue 98·5, I went at 5 P.M. into a Turkish bath, in which the air was at 130°. After twenty minutes the thermometer under my tongue showed 99·2; after an hour, 100°. I then had a cold douche, and a plunge in a cold bath, and the temperature under my tongue sank to 99. It was still 99 an hour later; but at night was at 98, that is, neither higher nor lower than usual.

Exp. 2. On Jan. 31st, 1866, having a temperature under my tongue of 99·1, after walking rather quickly, I entered at

4.30 a Turkish bath in which the thermometer stood at from 117 to 120 during the experiment. At 5 P.M. the tongue had risen to 100·1, and at 5.30 to 100·6. I then left the hot chamber, had a cold douche, and lay quiet to 6.15, when the tongue had fallen to 99·4. At 7.15 it had sunk to 98·5.

Exp. 3. Warm-water bath.

Aug. 2, 1865.	4.15 P.M.	Temperature under tongue, 98·8. Pulse 67. Temperature of bath also 98·8 at commencement.
	4.40 „	Temperature under tongue, 99.
	5.10 „	„ „ „ 98·8, temperature of bath having sunk to 96. Pulse 79.

After leaving the bath a quarter of an hour, the temperature under the tongue was still 98·8. The pulse had fallen to 68.

Exp. 4.

May 29, 1866.	4 P.M.	Temperature under tongue, 98·8. „ of room, 65. „ of bath, 98·8, and kept during the whole period of the experiment at this point by the addition from time to time of fresh hot water.
	4.30 „	Temperature under tongue, 99.
	5 „	„ „ „ 99.

The effect of external heat is, then, to raise the temperature of our internal organs; and doubtless prolonged exposure to cold would have the contrary result; but of this I have been unwilling to make trial. It is a curious fact, however, that a short exposure to cold, so far from lowering the temperature within us, has frequently the very opposite effect, and produces a slight elevation. Such I have often found to be the immediate effect of a plunge in cold water. The explanation of this is, I presume, to be found in the contraction of the superficial vessels under the influence of cold, and the consequent accumulation of warm blood in the internal organs.

In the experiments given above the heat applied externally was considerable, both in the warm-water bath and still more in the Turkish bath; and it still remains a question whether the slight diurnal variations in the temperature of the air would have any sensible effect on the temperature of our bodies, or rather of our internal organs. In order to

ascertain this, I divided the 8-A.M. observations of two whole months, June and July, into two sets; in the one set placing those observations which were taken with the air of the room below 70, and in the other the observations which were taken when the temperature was as high or higher than this point. I selected the 8-A.M. observations as those which were least affected by conditions of exercise and food. The results were these :

Average temperature of room, 8 A.M.	Average temperature under tongue, 8 A.M.
66·6	97·7
72·4	97·784

That is to say, the temperature under the tongue was very slightly higher on the warmer mornings.

The same result is obtained by comparing the winter observations with the summer ones at the same hour.

Season.	Average temperature of room, 8 A.M.	Average temperature under tongue, 8 A.M.
Winter months .	50	97·65
Summer months .	69·5	97·73

It would thus appear probable that the ordinary diurnal variations in external temperature may suffice to produce slight corresponding variations in our internal heat, but that these effects are excessively small, so as to be scarcely worth taking into account; and that to produce any marked effect much greater variations without are required.

(9) *Exercise* raises the temperature of the body, but, as Dr. Davy has pointed out, raises that of the extremities much more than that of the internal organs. Still even on these its effects are considerable, as any one may convince himself by taking the heat under his tongue before and after a sharp walk. Thus, to give a single example, the temperature under my tongue one day being at 3.30 P.M. at 98·6, I walked to the top of Highgate Hill, some five miles distance, and

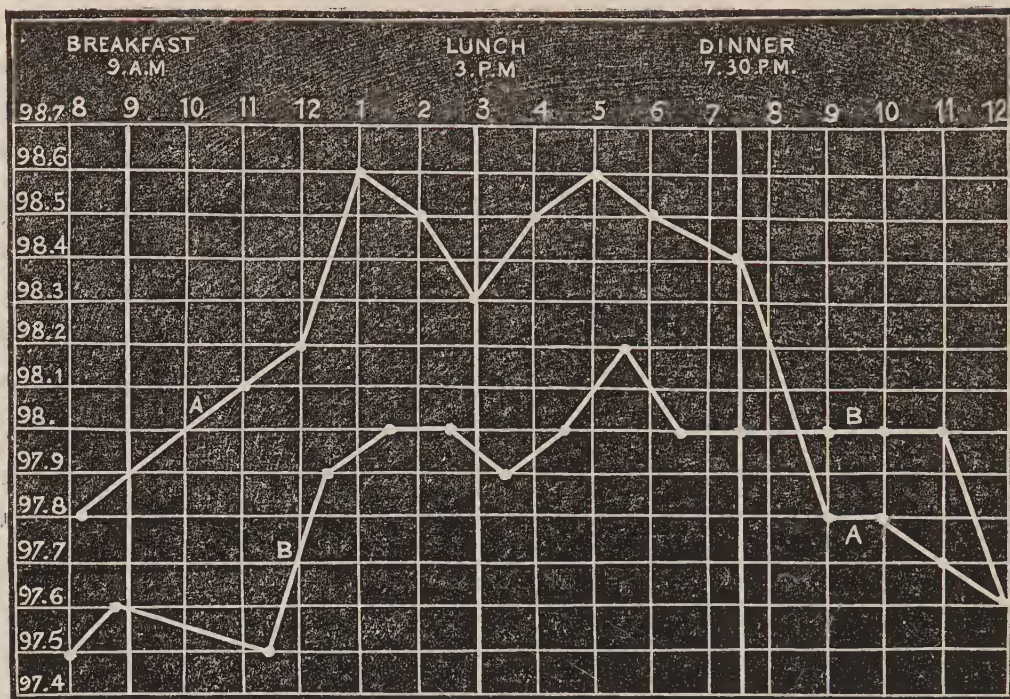
then found the thermometer mark 99·4. Invariably a good walk or other sharp exercise has raised me to some point between 99 and 100, that is, to a point rarely or never reached by me on ordinary days. But a much gentler exercise than this produces marked elevation. Even the slight exertion made in dressing after rising from bed causes a rise. Thus on July 6th, 1866, I took my temperature at 8 A.M.; it was 97·6. I remained perfectly quiet and awake in bed, without breakfast, for four more hours, and at the end of each hour found my temperature still at the same point, 97·6. I then rose and dressed, and, still without food, found it had risen to 98. Again, the average temperature of the tongue at 7.30 P.M., with ordinary mild exercise, was found by me to be 98·63, as the previous tables have shown. But the average at the same hour for twelve days, in which I spent the afternoon in perfect repose or nearly so, was only 98·29, which is a very large difference when we consider how limited is the whole range of fluctuation in the day.

It is to this potent effect of exercise that a striking difference in the results obtained from the two subjects of observation is to be ascribed. The one took habitually more exercise than the other and rather later in the afternoon; consequently in this person the afternoon rise is more decided and reaches its maximum rather later than in the other. Compare diagrams 2 and 3.

(10) *The effects of food.*—To ascertain these it is essential to abstain from all exercise, and to note the temperature at very frequent intervals. When this is done, fluctuations, of which an example is given in the following diagram (3. A), are observed. It will be seen here (A) that both breakfast and lunch have been followed by a considerable rise; but that dinner, on the contrary, has preceded a rapid fall. It will be better to consider each meal separately.

a. *Breakfast.*—On the days represented in the diagram (A) the rise after breakfast attained its maximum in four hours, and then a fall began. But the maximum is by no means reached invariably at the same hour. Sometimes it is reached in three hours, sometimes requires no less than six; in this latter case the breakfast rise becomes continuous with the lunch rise, no dip intervening between them. Out of

Diagram 3.



seven days, in which I took no exercise nor other food than breakfast so long as the observations lasted, the maximum was reached three times at 12 o'clock, once at 1 P.M., twice at 2 P.M., and once at 3 P.M.

Out of five days in which the fact was investigated in another person, the maximum was reached three times at 12, twice at 1 P.M.

The highest elevation above the 8-A.M. temperature caused by breakfast was in both persons $\cdot 8^{\circ}$, the lowest in both $\cdot 4^{\circ}$, the average in both $\cdot 6^{\circ}$. But the whole of this rise is not due to breakfast, for the 8-A.M. temperature was taken immediately on rising; and some little increase is, as I have already mentioned, caused by the slight exertion of dressing.

When the maximum was once reached, usually a fall set in immediately, but sometimes the maximum was maintained for an hour, never for more than this.

β. Lunch.—This meal always produced a rise; but one very variable in amount, probably because the meal itself was very variable. The light lunch I most usually took caused a much less decided elevation than did breakfast, though not rarely the actual point reached was higher than the breakfast maximum, the starting point having been higher.

γ. Dinner.—The effect of dinner contrasted strangely with that of the previous meals. Each of these produced a rise, more or less considerable; but after dinner there was a continued fall.

Of course, on ordinary days, when exercise is taken in the afternoon, a great part of the after-dinner fall is merely the result of the gradual cooling of the body, heated by exertion. But this is not the whole explanation. The fall occurs when no exercise is taken, and when, therefore, there has been no such heating of the body; as in fact the diagram (A) shows.

Can the different consequences of the meals be explained by their composition? If so, inversion of the order of the meals should produce a rise in the evening, and a fall in the morning. I therefore tried the following experiment. I ate an ordinary dinner—fish, mutton, with a pint of claret—one morning at 9.30 A.M., and an ordinary breakfast the same day at 7.30 P.M.; at lunch-time (3 P.M.) I ate some sandwiches. The result is given in diagram 3 (B). There was a slight fall after the morning meal instead of the usual rise, but this fall soon gave way to a steadily-maintained elevation. After the evening meal there was no actual rise, but the temperature was maintained for a considerable time at the level at which it had been before the meal.

It would thus appear that some part in the phenomenon in question is due to a difference in the food taken at breakfast and at dinner. But it also equally appears that only some part of the phenomenon can be thus explained. There is still a rise after the morning meal, though it is deferred to a later hour, and still an absence of a rise after the evening meal.

Some part of the difference, then, is due to some difference in the food. To what part of the food? Suspicion naturally fell on the claret. I therefore made the following experiment. For ten nearly successive days I remained during the afternoon quietly reading in an arm-chair, so as to exclude the effects of muscular exercise. On five of the days I took no wine with my dinner, but a cup of tea; on the others, instead of the tea, I took the best part of a bottle of light claret. The temperature was taken every hour till midnight. The results confirmed my suspicions. The difference de-

pendent on the fluids consumed. On each of the claret days there was a rapid fall for an hour and a half after dinner, succeeded by a partial recovery. On each of the non-claret days this first rapid fall was wanting. Once there was even a slight rise for the first two hours. On the other four occasions there was a very slight fall for the same period; and in all five there was a more rapid fall after nine.

The average results for each hour were these:

Fluids.	7.30.	9.	10.	11.	12.
With wine .	98.32	97.78	97.8	97.9	97.86
With tea .	98.2	98.19	98.06	97.98	97.76
With water .	98.6	98.3	98	97.8	97.8

I have added in the table, for the sake of comparison, the results obtained on a day (without exercise as before) when neither tea nor claret were taken. It would have been more fortunate had the temperature in each case been the same at starting; but this need not interfere with the comparison of the several series, though it of course interferes with any comparison of the actual temperatures at any given hour in the evening.

It would appear:

1. That when neither tea nor alcohol is taken, the temperature falls after dinner, with tolerable evenness, till night.
2. That the addition of claret to dinner causes the fall for the first hour and a half to be much more rapid, but that after this there is a partial recovery.
3. That the addition of tea, on the other hand, considerably retards the fall in the first few hours after dinner.
4. As tea and claret exercise precisely opposite influences, the contrast is most striking between the days when tea and the days when claret is taken.

I cannot but point out how admirably these results tally with the observations made by Dr. E. Smith as to the action of foods upon the respiration. This physiologist has shown by careful experiment that the combustive process, as mea-

sured by the exhalation of carbonic acid, is retarded by most alcoholic drinks, and stimulated by tea* (*Phil. Trans.* 1859).

(11) We still have to consider how it is that the same meal, which taken at 9 A.M. is followed by a considerable rise, is, when taken at 7.30 P.M. followed merely by a retarded fall. There must clearly be some influence at work which counteracts the powerful operation of the food. As I have already shown that the early morning rise is not due to the direct action of light, I think I may take it for granted that the depressing evening influence is not merely darkness. The inevitable evening fall is doubtless due to the cessation of the cause which produces the early morning rise. If, then, the hypothesis I before suggested be correct, the cause of the evening fall would be the gradually diminishing activity of the organic functions. That these functions do begin at this time to take a partial rest, is shown by the diminished exhalation of carbonic acid which Dr. E. Smith and others have found inevitably to occur in the evening, while the organs of animal life are still wide awake. At a later hour, which depends on the time when we go to bed, the organs of animal life, the muscles and the brain, also fall asleep; and the whole system being now in a more or less perfect state of inactivity, our temperature falls to its minimum.

(12) The general conclusions, then, at which I arrive, are these:

a. The temperature of the internal organs is at its minimum about 6 A.M. After this there is a rise, which, under such conditions of life as I have described, reaches its maximum late in the afternoon. Then a fall begins, which lasts to 6 A.M. again.

β. The range within which the ordinary diurnal fluctuations occur is not of greater extent than about $1\frac{1}{2}^{\circ}$ Fahr.

γ. The greater part of the rise is due to the combined influence of exercise and food.

* It is necessary to say that claret was not one of the alcoholic drinks experimented on by Dr. E. Smith, and that different alcoholic fluids differ in their action on the respiration. I venture, however, to foretell that claret will be found to belong to the same class as brandy and gin, which lessen the respiratory changes, and not to the class of rum and malt liquors, which increase them.

δ. Exercise causes a considerable rise, whenever taken.

ε. Food causes a rise which is most marked after breakfast, less so after lunch, and which is reduced after dinner to a mere retardation of the fall which without it would occur.

ζ. Alcohol (or rather claret) causes an immediate rapid fall. But this effect is temporary, and a reaction ensues, by which the temperature is carried to as high a point, or even higher than it would have reached had no alcohol been taken.* Tea, on the other hand, causes an elevation of temperature.

η. The internal temperature varies with that of the external medium; but the small variations which occur in the air in the course of twenty-four hours scarcely produce appreciable results on our internal warmth.

θ. There is a rise in the early morning while we are still asleep, and a fall in the evening while we are still awake, which cannot be explained by reference to any of the hitherto mentioned influences. They are not due to variations in light; they are probably produced by periodic variations in the activity of the organic functions.

ι. The organic functions, like those of animal life, have their period of repose; but their repose is less perfect, and begins and ends earlier.

* I find I have omitted in the text the reason which leads me to believe that the reaction after the first fall from alcohol carries the temperature to a higher point than it would have reached had no wine been taken. It is this. The 12-P.M. temperature for nine nights in May, June, July, 1865, when I dined in large parties and drank more than my ordinary quantity of wine, was 98.35° , which is far above my usual average at that hour, 98° . I think also that this secondary elevation of temperature is maintained for some time; for the morning temperature on the days succeeding these nine occasions was, on the average, 98° , whereas the average for the rest of the three months at this hour was only 97.73° . This morning elevation after wine was also observed by Dr. Davy.

First Series.—MAN.

MAY 1885.	Before breakfast.	11-2.	3-5.	7-7.30.	9-10.	11-12.30.
7	. . .	. . .	98.8			
8	97.6	98.5				
9	97.8	. . .	98.6			
10	97.4	98	98.2	. . .	98	98
11	97.4	. . .	97.7	. . .	. . .	97.5
12	98	98.8	. . .	. . .	. . .	97.8
13	97.2	. . .	. . .	. . .	. . .	98.5
14	97.3	. . .	. . .	98.6		
15	97.8	. . .	. . .	98.2	. . .	97.8
16	97.7	. . .	. . .	98.2	. . .	97.6
17	97.8	. . .	. . .	98.4	. . .	97.6
18	97.4	97.8	98.3	99	98	
19	98	98.2	98.5	98.8	. . .	98.6
20	97.4	. . .	. . .	98.4	. . .	98
21	97.8	98.2	. . .	. . .	. . .	98.6
22	97.8	98	. . .	98.6	98.2	98
23	98	. . .	98.4	. . .	. . .	97.8
24	98.2					
25	97.6	98.6	99	. . .	. . .	98.2
26	97.8	98.2	98.8	. . .	. . .	98.2
27	. . .	. . .	98.4	98.3	. . .	98
28	97.8	98	. . .	98.6	97.9	
29	98	97.6	98.4	99	98.1	97.6
30	97.6	. . .	98.2	98.2	. . .	98
31	97.8	. . .	98.2	98.6	. . .	98.5
JUNE						
1	97.6	98.2	98.4	98.9		
2	97.4	. . .	. . .	98.3	. . .	97.3
3	97.6	97.9	. . .	98.2	97.8	97.8
4	97.4	97.8				
5	97.8	98.5	98.4	98.9	. . .	98.1
6	97.8	98.4	98.2	98.4		
Average	97.7	98.2	98.4	98.5	98	98
Pulse	66	63	61	70	74	79

First Series.—MAN.

JUNE 1865.	Before breakfast.	11-2.	3-5.	7-7.30.	9-10.	12-12.30.
7	98	98.2	98.5	98.4	. .	97.4
8	97.4	. .	98.6	98.2		
9	97.8	. .	98.4	98.9	. .	97.8
10	97.6	. .	98.2	99	. .	98
11	97.6	97.7	. .	. .	. .	97.8
12						
13	98.2	. .	98.2	98.6	. .	98.2
14	97.4	98	98.5	. .	. .	97.8
15	. .	. .	98.4	98.8	. .	98.6
16	97.6	. .	. .	. .	. .	97.8
17	98	. .	. .	98.4	. .	97
18	97.6	. .	. .	. .	. .	98.1
19	97.5	. .	98.1	98.2	. .	97.6
20	97.6	. .	98.4	98.8		
21	97.8	. .	98.6			
22	97.9	. .	. .	98.2		
23	98.2	. .	98.4			
24	97.9	. .	. .	. .	. .	97.6
25	97.5	. .	98.3	. .	. .	98
26	98	98.4	98.1			
27	97.8	. .	. .	. .	. .	98.4
28	97.9	98.4	. .	98.4	. .	97.8
29	97.8	. .	98.3	98.9	. .	97.8
30	98	. .	. .	98.4	. .	98.4
JULY						
1	97.6	. .	. .	. .	. .	97.8
2	97.6	. .	. .	. .	. .	97.9
3	98.2	98.6	98			
4	98	. .	98.3	98.8	. .	98
5	98.2	98.4	98.5	98.8		
6	97.8	98.2	98.8	. .	. .	98.6
Average	97.8	98.2	98.4	98.6	. .	97.9
Pulse	65	60	58	63		77
Temp. } of air }	70	70	70	68		68

First Series.—MAN.

JULY 1865.	Before breakfast.	11-2.	3-5.	7-7.30.	9-10.	12-12.30.
7	98	98.4	. .	99		
8	97.7	. .	98.2			
10	. .	. .	. .	98.6	. .	97.9
11	97.6	. .	98.1	99	. .	97.8
12	97.6	97.9	. .	98.4		
13	. .	. .	98.4	98.5	. .	97.6
14	97.5	97.9	98	98.6	. .	98.4
15	97.4	. .	98.4	98.7		
16	. .	. .	98.6	98.7	. .	98.4
17	97.7	98				
18						
19						
20	97.8	. .	. .	. .	. .	98.4
21	97.9	. .	. .	98.8		
23	97.8					
24	97.7					
25	97.6	. .	98.6	99.2	. .	98.2
26	97.8	97.9	98	. .	. .	98.3
27	97.6	. .	98.4	. .	. .	98
28	97.8	97.8	. .	98.9	. .	98.2
29	97.8	98.7				
30	97.8					
31	. .	98.3	. .	98.7		
AUG. 3	97.8	98.7	. .	. .	. .	97.8
4	97.8	98.5	98.4	99	. .	97.3
5	97.9					
6	97.8	. .	. .	98.5	. .	98.2
Average	97.7	98.2	98.3	98.8	. .	98
Pulse	65	59	59	68		77
Temp. } of air }	69	68	69	68		69

First Series.—MAN.

JAN. 1866.	12.30-1 A.M.	3-5 A.M.	5.30-6.30 A.M.	8-9 A.M.
16	98	97·7	97·6	97·8
17	98·3	. .	97·2	97·9
20	98	97·6	. .	97·6
21	97·6	97·4	. .	97·8
26	97·6	. .	97·4	97·6
FEB.				
8	97·9	97·6	. .	97·4
11	97·6	97·4	. .	97·8
18	98	. .	97·2	97·7
26	98	. .	97·2	97·6
MARCH				
1	97·9	. .	97·2	97·5
2	97·8	. .	97·2	97·4
3	97·8	. .	97·1	97·5
5	97·8	. .	97·2	97·6
8	97·5	. .	97·3	97·4
9	97·7	. .	97	97·6
14	98·2	. .	97·2	97·6
20	98	. .	97·2	97·8
APRIL				
20	97·8	. .	97·2	97·7
24	98·2	. .	97·6	98
25	97·7	. .	97·2	97·8
Average	97·9	97·5	97·2	97·7
Temp. } of air }	56	56	49	50

Second Series.—WOMAN.

MAY 1865.	Before breakfast.	11-2.	3-5.	7-7.30.	9-10.	12-12.30.
7	. .	. .	99			
8	98	98·6				
9	98·3	. .	99			
10						
11	98·1	98·6	. .	. .	. .	98·2
12	97·9	98·9	. .	. .	. .	98
13	97·6	. .	. .	. .	. .	97·9
14	97·6	. .	. .	98·4	. .	98
15	97·8	. .	. .	98·6	. .	98
16	97·6	. .	. .	98·4	. .	98·2
17	97·7	. .	. .	98·6	. .	97·6
18	98	98·2	99	98·6	. .	98
19	97·7	98·2	. .	98·4	. .	98
20	. .	. .	. .	98·4	98	97·8
21	98·2	98·1				
22	97·8	98·6	. .	. .	. .	97·8
23	98	98·4				
24	98					
25	97·8	98·1	. .	. .	. .	97·6
26	98	98·4	. .	98·4	. .	98
27	98	97·9	. .	98·2	. .	97·6
28	97·4	98	. .	98·4	98·4	97·9
29	97·8	98·4	98·5	98·6	98	97·6
30	98·4	98·6	98·6	. .	. .	98·2
31	98	98·7	. .	98·9	. .	98·2
JUNE						
1	98·4	98·6	. .	98·8	98·8	98·4
2	98·2	. .	98·6	98·6	98·4	98·2
3	98·2	98·8	98·8	98·8	98·6	98·4
4	98·6	99·1				
5	98·4	99	99·1	99	98·8	98·6
6	98·3	99	98·8	99·2		
Average	98	98·5	98·8	98·6	98·4	98

Second Series.—WOMAN.

JUNE 1865.	Before breakfast.	11-2.	3-5.	7-7.30.	9-10.	12-12.30.
7	98.4	99	98.9	. . .	98.7	98.4
8	98.4	. .	99.2	99.2	. .	98
9	98.2	98.8	99	98.7	. .	98.6
10	98.4	. .	99	98.8	. .	98
11	98.4	98.2				
12	98	98.4	98.3	98.2		
13	98.2	98.6	. .	99	. .	98.2
14	97.8	98.6	98.9	98.5	. .	98.2
15	98	98.5	98.2	98.4	. .	98
16	98	. .	. .	. .	. .	97.7
17	98	98.3	98.3	98.4	. .	97.8
18	98.2	. .	. .	. .	. .	97.6
19	97.8	98.6	98.8	98.6	98.4	97.8
20	97.8	. .	98.6	. .	. .	97.9
21	97.7	. .	98.7	. .	. .	98.4
22	97.8	. .	. .	98.4	. .	97.7
23	98.2	. .	. .	. .	. .	98.2
24	97.6	. .	98.6	98.2		
25	97.4	. .	. .	98	. .	98.1
26	98.2					
27	98	98.4	. .	98.6	. .	97.6
28	98.1	. .	. .	98.4	. .	97.8
29	97.8	. .	98.4	. .	. .	97.6
30	. .	. .	. .	98.4	. .	98
JULY						
1	97.7	. .	. .	. .	. .	98
2	97.9	. .	. .	. .	. .	97.9
3	97.8	. .	. .	98.6	. .	98.2
4	98.4	98.8	98.6	98.6	. .	98.4
5	98.2	98.8	98.9	99.2	. .	98.6
6	98.4	98.6	98.8	99	. .	98.8
Average	98	98.6	98.7	98.6	98.55	98

Second Series.—WOMAN.

JULY 1865.	Before breakfast.	11-2.	3-5.	7-7.30.	9-10.	12-12.30.
7	98.5	98.8	98.9	98.8		
8	98.4	98.8	98.9			
10	. .	. .	. .	99	98.8	98.7
11	98.6	99.2	99.2	99.1	. .	98.4
12	98.8	99.1	99.3	99.1		
13	. .	99	99	99	. .	99
14	98.4	99.2	99.1	99.2	. .	98.5
15	98.2	98.8	98.8	98.9	. .	98.4
16	98.2	98.8	98.7	98.8	. .	98.4
17	98.1	98.8				
20	98	. .	. .	. .	. .	98
21	98	. .	. .	98.8	. .	98.4
22	97.9	. .	. .	. .	. .	97.9
23	97.8	. .	. .	98.2	. .	98
24	97.6	. .	. .	. .	. .	98
25	97.8	98.5	98.6	98.6	. .	97.8
26	97.9	98.3	98.6	98.4	. .	98.2
27	98	98.2	98.3			
28	97.8	98.2	. .	98.2	. .	97.9
29	97.8	98.4	98.5	. .	. .	98.4
30	97.8	98.2	98.3	. .	. .	97.8
31	97.6	98.1	. .	98.4	. .	97.6
AUG. 1	97.8	98.3	. .	98.2	. .	97.6
2	97.6	. .	98.6	98.2	98	97.6
3	. .	98.5	98.6	98.5	. .	97.5
4	98	98.4	98.6	98.2	. .	97.7
5	98	98.4	. .	98.5	. .	97.8
6	98	. .	. .	98.2	. .	97.8
Average	98	98.6	98.75	98.6	98.4	98

XVII. ON RUPTURE OF ARTERIES DEPENDENT ON EXTERNAL INJURY.

THE record of facts which in any degree determine the diagnosis, or define the symptoms and treatment, of rupture of arteries dependent on external injury is of such importance that I do not hesitate to reconsider a subject which has already been most ably and practically discussed in an elaborate article in a recent number of *Guy's Hospital Reports*.*

In the consideration of "this rare accident," as Mr. Poland very justly terms it, he has confined his observations to rupture of the popliteal artery and rupture of popliteal aneurism; as the occurrence of rupture of the coats of an artery is found to take place most frequently, and almost as a general rule, in the popliteal space, either from accident when in a state of health, or when diseased and under the condition of aneurism.

But though the popliteal artery is the vessel most exposed or liable to this injury, the rupture of arteries in other situations occurs in sufficient numbers to render the accident worthy of notice, especially as no cases are mentioned or referred to by Mr. Poland in the memoir to which allusion has been made. The following case, from Mr. Pick's notes, in which the femoral artery was completely torn through, is highly interesting from the marked character of the symptoms.

CASE I.—A man, æt. 37, was admitted into St. George's Hospital on the 30th of December, under the care of Mr. Pollock. The day before admission, the patient, while riding on the shaft of a cart, was thrown off and the wheel passed over him. It was evident that he was seriously injured and had sustained some unusual damage to the thigh; and the following day he was conveyed to the Hospital. When admitted he

* Vol. vi. p. 281, Third Series, 1860.

was very cold, having travelled some ten miles in an open cart in the month of December. He appeared in an extreme condition of collapse, much as if he were likely to die before reaction would take place. The pulse was very feeble, and the countenance was drawn and anxious.

The left limb was found to be enormously swollen from the effusion of blood into all the tissues, all the way from the toes to the thigh, groin, and nates.

The limb throughout was quite hard, and the skin very tense. The surface of the foot and leg was icy cold. No pulsation could be distinguished in the tibial vessels.

Just below the knee there was a small contused wound. Above the knee there was on the inner side of the thigh a large discoloured patch of bruised skin, with extensive extravasation of blood underneath. The limb was rather warmer above the knee, but the tissues were tense and hard. The integument was discoloured as high as the nates posteriorly, and the parts here were considerably swollen from extravasation of blood. The whole limb, from the toes to the nates, was in size greatly in excess above the opposite one. The surface of the integument from the knee downwards varied in colour, and was much darker generally than natural, and was assuming a threatened gangrenous character. There was in addition to this extensive mischief a comminuted fracture of the right leg. There was great depression of the vital powers, and the surface of the body was generally cold. He was shivering, in fact, from the condition which the cold journey had produced, added to the injury received.

In consultation with his colleagues Mr. Tatum and Mr. Holmes, Mr. Pollock decided that an operation would not be justifiable, the patient's condition being such that in all probability he would have sunk under an attempt to remove the limb; and as it was impossible to define the exact spot where the injury to the artery had taken place, there was no evidence sufficiently clear to justify an exploratory operation for the purpose of securing the divided ends of the vessel. The opinion arrived at was, that the femoral artery had been lacerated in some portion of its lower third, and that probably the vein was similarly injured.

The limb was wrapped up in layers of carded wool, and a flannel bandage applied over all; a bottle of hot water was placed against the foot; hot brandy and water was ordered to be given freely to the patient, and he was well covered over with blankets.

On the following day he had rallied a little. The pulse was very weak, and the countenance expressive of great anxiety. The leg was rather warmer and softer, but more discoloured. He was constantly sick. In the evening of this day he was in much the same condition; but later in the night he was attacked by sudden convulsions, and died early the following morning.

Post-mortem examination.—A large surface of bruised tissue was observed about the inner surface and lower third of the thigh

and the popliteal space. A large quantity of black coagulum was found in an irregular freshly-formed cavity in the cellular tissue and soft parts in and around the popliteal space. The femoral artery was found to have been completely torn across, almost as if divided by a knife, just as it was about to turn round the femur on entering the popliteal space. The extremity of the upper portion of the artery had a pointed decolorised coagulum hanging from its orifice, by which the latter was completely stopped up; so that when water was injected into the femoral from above, the fluid passed into the popliteal space by drops only. The orifice of the extremity of the lower portion of the artery was also blocked up by coagulum; so that apparently no hæmorrhage had occurred from either extremity of the divided vessel some time previous and subsequent to the man's admission into the Hospital. The femoral vein was not injured.

The particulars of this case are so interesting, and its symptoms so clear, that it will be here appropriate to make some remarks on the *diagnosis* of ruptured artery from external violence without any corresponding wound of the soft tissues communicating with the injured vessel.

Extensive extravasation of blood in either of the extremities, if of a *venous* origin, is almost invariably localised to a certain extent. That is to say, it is more or less defined, or the mass of effused blood is circumscribed at an early stage; nor after an early period is this limit exceeded, nor its circumference increased. It is in the first instance limited to the surface, if the bruise be superficial; and in this instance it does not continue to steadily and progressively spread, as would be the case were an injured artery the cause of the extravasation. If deeper seated, the venous extravasation will be bounded more or less by those structures which surround the damaged tissue. And so it happens in the vast majority of cases—in the early periods of extravasation of venous blood—that general, uniform, and excessive superficial, as well as deep-seated extravasation, does not occur in a case of ruptured vein, be it ever so considerable in size or important in position; exception of course being made to the veins within the thorax or abdomen, as they have no surrounding tissues similar to the veins of the limbs to compress and to assist in arresting hæmorrhage by pressure.

But with arterial hæmorrhage, subcutaneous and inter-cellular, dependent on ruptured artery without an external wound, the nature of the extravasation is quite different in

most respects, and is very marked in character. It is no longer localised to any extent; it is diffused as regards the whole limb, and general as regards all its tissues, superficial as well as deep-seated: it invariably extends, and as it extends it pervades throughout the subcutaneous and intermuscular cellular tissue. If by accident the muscles be lacerated, those muscles become equally discoloured and saturated by blood. It especially pervades the surface and circumference of the limb, and generally to this extent gives a distinct discoloration to the skin.

The contrast between the effects of ruptured vein and ruptured artery is also marked by the relative tension of the skin in the respective injuries.

In ruptured vein, the extravasation is entirely localised to the neighbourhood of the injury; but the surface of the integuments over the injury is soft compared to the condition of the skin and subjacent tissues in a case of ruptured artery. In the latter accident, when all the coats are torn through, the hæmorrhage continues until the surface of the limb becomes tense and hard; and probably it does not happen until this tension and hardness have become considerable, that sufficient compression is exerted on the divided vessel to make it cease bleeding, and to allow the clot of obstruction to form.

The pressure requisite to obstruct a vein is well known to be but trivial; the very tension which is characteristic of ruptured artery is nature's safeguard to the patient's life.

We may therefore fairly conclude that an extreme state of tension of the limb, accompanied by hardness of the soft parts—a hardness not readily yielding to pressure, the skin not pitting on compression—is one of the most important diagnostic signs of ruptured artery, when this condition follows rapidly on an external injury—a bruise or a crush of the soft tissues, of either upper or lower limb.

The general hardness of the limb, with discoloration of the skin from extravasated blood, a cold extremity, a loss of sensation, a pulseless condition of all the vessels below the seat of injury—these constitute the main and marked symptoms of a ruptured artery in a limb, ruptured through all its coats, though no external wound be present to account for its direct injury.

In rupture of the femoral or popliteal artery there will, however, be much immediate constitutional disturbance, occasioned by the actual loss of blood. Though there be no external wound, the amount of extravasation in such cases is invariably large, and with it a corresponding amount of collapse ensues; for it must invariably be borne in mind that extravasation of blood, be it into the cellular tissue or a serous cavity, though present in the body, is so much lost from the general circulation—and according to its amount, so is the severity of the collapse.

The foregoing remarks apply chiefly to the early evidences of a ruptured artery. As hours pass by, or as the case is treated, so the symptoms will change; but invariably the skin below the injury becomes darker in colour, colder to the touch, and probably insensible to external impressions. Vesication, or even gangrene, may rapidly supervene. But usually—in the lower limb we may say *invariably*—gangrene commences sooner or later, and sooner or later will destroy life if appropriate measures, removal of the limb, be not adopted to remedy its consequences. In a subsequent observation such results will be satisfactorily proved to have occurred in all the cases recorded by Mr. Poland. I add one more case to the list.

CASE II.—J. T., æt. 27, was admitted into St. George's Hospital October 30th, 1862, under the care of the late Mr. H. C. Johnson. A short time before admission, the patient, while riding on the shaft of a cart, was suddenly thrown off and fell to the ground, and the wheel of the cart passed over his left leg.

When admitted he was much collapsed. The skin was cold, and the pulse very weak and quick. He complained of great pain in the left thigh, which was enormously swollen, almost as large round as the trunk, from effused blood. The swelling extended upwards as far as the junction of the upper and middle third of the thigh, and downwards to the ankle. In the thigh and about the knee the skin was much discoloured and bruised, but no external wound existed. Lower down, the limb was white and wax-like. There was no pulsation in the tibial arteries, but pulsation was readily felt in the femoral in the groin.

The patient rallied on the following day, with a pulse of 120 and a hot skin. He complained of pain in the thigh, and of the leg feeling dead. The limb was more swollen and more discoloured. The foot was icy cold.

Four days after admission gangrene commenced to show itself.

The toes were discoloured and insensible, with dark bullæ on the foot. No pulsation could be detected in the tibials.

From this date, November 4th, to the 11th, the gangrene spread gradually to the middle of the leg, and the line of demarcation now became fairly established some distance below the knee. He appeared improved in his general condition, and there was less feverish excitement. Amputation was performed above the knee. Very considerable hæmorrhage occurred, and a great number of vessels had to be tied.

The examination of the limb showed that the leg was gangrenous to within a short distance of the knee-joint. The popliteal space and cellular tissue in the neighbourhood were full of clots of blood. The popliteal artery and vein were ruptured just below the spot at which they pass through the opening of the adductor. Both ends of the vein were closed by plugs of fibrine. The distal extremity of the artery was also closed by coagulum. The cardiac extremity was contracted and retracted, but was not completely plugged.

The patient recovered.

In these severe injuries which we have under consideration, the question of *treatment* must be decided, on the one hand, by the nature of the artery injured; on the other, by the amount of injury to the soft parts.

If, for instance, the rupture of the artery be complete, so that all the coats of the vessel be partially or completely severed; if such rupture affect the femoral or the popliteal; and if those symptoms which we have described, as usually the accompaniments of this injury, be present, then amputation must sooner or later be had recourse to. If, however, such an injury be sustained by the axillary or the brachial artery, amputation may possibly be avoided, and recovery take place without the loss of the limb.

These observations, it will be found, are confirmed by those of Mr. Poland. "Of complete rupture of the popliteal artery without any external lesion," he has reported eight cases. All of them were due to external violence; and the results are so interesting and important for the guidance of the surgeon, that no apology is necessary for gleanings largely from them.

In two cases the popliteal vein was ruptured with the artery. These, with the case recorded above, make three in which this complication occurred; a complication which indubitably marks out the necessity and advantages of ampu-

tation over every other kind of treatment. In *all the cases* gangrene supervened, with the exception of those in which immediate amputation was had recourse to. In three of the cases the gangrene followed upon ligature of the vessel, either at the seat of rupture or at the proximal end. In the three other cases no preliminary measures were adopted, but gangrene supervened in all.

In these three latter cases amputation was performed in consequence of the gangrenous state of the limb at different periods from the date of the injury: in one case on the 42d day, in another case on the 32d day, in the third case on the 14th day. In each instance recovery took place.

In the five cases which remain to be considered, immediate operation, either that of applying a ligature or amputation, was had recourse to; but each case proved fatal. In two of the cases immediate amputation was performed. In one, the ends of the popliteal were ligatured through a free incision in the ham; subsequent amputation, however, was performed, but proved unsuccessful. In two, the femoral artery was tied: in both these cases gangrene supervened. One of them died rapidly; in the other amputation was had recourse to on the 22d day; but the patient died three hours subsequent to the operation.

The results of these cases confirm the view taken of the treatment to be adopted in this serious injury, and which I venture to urge as imperative, viz. that amputation is preferable to cutting down upon the ruptured artery and tying both ends, or to tying the femoral above the seat of injury.

The first case related in this paper confirms this view. It was impossible to decide at which point the artery was lacerated; so that a proposal to cut down upon a portion of the vessel, with a supposition that the injury was confined to the popliteal space, would have ended in failure and discomfort; to have exposed by incision the deeper tissues saturated with extravasated blood, would surely have terminated in extensive and probably fatal suppuration, supposing the patient to have survived, even for a few days, such an operation. Nor do Mr. Poland's investigations give the slightest encouragement to such a proceeding. But beyond all, it is impossible to predict or decide what complications may not exist in these

severe lacerations of arteries; the vein may be ruptured, as occurred in three of the cases recorded, or other serious complications may exist, the presence of which the surgeon might not be able to detect until he had cut down to the injured vessel.

Nor can we advocate the application of a ligature to the femoral above the seat of rupture. The wound necessarily produced by such a proceeding, in a part probably loaded to excess with extravasated blood; the loss of blood already occasioned by the ruptured artery; and the further diminution of the circulation (by the ligature to the femoral), in a part already deprived of most of its vital power; all these circumstances indicate the inutility and the risk of such a proceeding; and it is seen that the treatment was utterly useless, if not mischievous, in two cases in which it was adopted.

Amputation appears to offer the best prospect of saving life, under all considerations, when the femoral or popliteal is the vessel involved. The question, however, will always arise, whether it should be immediate or deferred? On this point, it has been judiciously observed by Mr. Poland, "there can be no doubt that when a limb is so thoroughly injured as to preclude all hopes of saving it, the primary operation ought to be performed, instead of allowing the patient to run the risk of passing through all the dangers attending gangrene, which necessarily induces great constitutional irritation and disturbance."

In the first case related, had the condition of the patient justified recourse to amputation, it would have been performed; but the state of exhaustion was such, that it appeared probable to those who examined him, that he would have died before the operation could have been completed; and although, from all appearances, it was probable that no additional hæmorrhage occurred from the ruptured femoral after his admission into the Hospital, he died like one from loss of blood.

With the evidence before us, it is satisfactory to find that rapid death after injury of one of the larger arteries is, in the majority of cases, rather the exception; that in many cases some days may elapse without an absolute necessity arising for interference on the part of the surgeon; and that ampu-

tation may be successfully performed many days after gangrene has commenced.

The lesson we learn from our personal experience, and from the observations of others who have investigated this interesting subject, is that primary amputation should be had recourse to, provided the patient is in a condition to survive the shock of the operation : if this be not likely, then the surgeon must wait, and watch for such opportunity as may arise, and offer better chance of success.

A few concluding remarks may be here appropriate upon the effects of partial rupture of an artery ; an injury which may entail, according to its situation, severe symptoms, or even necessitate the loss of the limb.

In the Museum of St. George's Hospital (Prep. 87, Series vi.) is a preparation which shows rupture of the two inner coats of the femoral artery, caused by an injury from the horn of a bull ; the outer coat of the artery is entire. In the case in which this accident occurred, the femoral vein was torn across ; and the patient died a few minutes after the accident from hæmorrhage from the vein. In another case (Prep. 95, Series vi.) laceration of the two internal coats of the axillary artery may be seen. The internal coats were dissected from the external coat for about half an inch, and turned down into the cavity of the vessel, so as to block it up. A red coagulum was lodged in the vessel above the inverted portion of the internal coats. The external coat was entire. The patient had been thrown from a horse, and died from the effects of laceration of the brain soon after the accident. On admission, it was said that the pulse could be felt, distinct yet weak, in both wrists ; but about two hours afterwards it was noticed that he had no pulse in the left wrist, though that in the right was quite perceptible. On further examination, it was found that the pulsation of the artery could be traced down to the lower part of the axilla, and there ceased abruptly. There was no evidence of injury to the axilla, beyond the existence of a small quantity of blood found in the axillary space.

In the first of the two cases, the circumstances of the lacerated vein, the external wound, and the obstruction of the femoral artery, would have rendered amputation not only justifiable, but advisable ; and had the patient been seen and attended to sufficiently early to arrest the venous hæmorrhage, the operation should certainly have been had recourse to without delay : otherwise rapid gangrene would most probably have shortly destroyed the patient.

With respect to the second case, it is probable that the patient might have recovered from the effects of the injury to the artery without operative interference had he been free from other injuries; but if, in addition to an injury of the artery, the axillary vein had been lacerated, it is more than probable that gangrene would have rapidly occurred, and amputation alone held out a prospect of recovery.

If we may draw any conclusions respecting the relative treatment of a rupture of an artery occurring in the leg or the arm, I would say as regards amputation, circumstances permitting, primary amputation should be had recourse to in the more grave injury, viz. when the femoral or popliteal is implicated; but that we may prudently wait for gangrene to commence, as a guide for our treatment in the removal of the arm, when rupture of the axillary or brachial occurs.

GEORGE POLLOCK.

XVIII. ON THE FORMATION OF COAGULA IN THE CEREBRAL ARTERIES.

SINCE Dr. Kirkes pointed out the connection between vegetations in the heart and obstructions in the arteries, much attention has been bestowed upon the nature and origin of fibrinous coagula.

In the cases which I have to relate clots existed in the arteries of the brain under circumstances which show that they were not conveyed from the heart, but originated where they were found.

The cases reported were examined in the dead-house of the Hospital during the last five years.*

The author is responsible for the pathological details. When the clinical account has been furnished by some one else, the name of the reporter is given.

CASE I.—John Harding, 39 years of age, a coachman, was admitted June 21st, 1861, under the care of Dr. Pitman.

He had had good health, as far as could be learned, until the morning of his admission. He had been out during the early part of the night. On his return, at 3.30 A.M., while in the act of hanging up the harness, he suddenly fell down in a fit, in which he was quite unconscious, and had foaming at the mouth. He was at once brought to the hospital. He was then perfectly unconscious. There was total loss of sensation and of movement in the right limbs; no reflex action could be excited in them. The mouth was drawn to the left side; there was slight ptosis of the left eyelid; the pupils acted slightly. The evacuations were passed into the bed, the bowels having acted under remedies. Pulse 100. There was frequent vomiting. The condition of the patient did not alter until the evening, when, at 9 o'clock, he had a second seizure with slight convulsions and much foaming at the mouth. The breathing then became stertorous, and he died at 10.30, nineteen hours after the attack.

Post-mortem examination.—The right hemisphere of the brain was

* An abridgment of Cases I. and III. has been published by Dr. J. W. Ogle in the *Br. and For. Medico-Chirurgical Review* for October 1865. The cases are there numbered CCLIV. and CCLVI.

fuller than the left ; its convolutions were flattened, and the pia mater was pale, as if the vessels had been emptied by pressure. A large quantity of clear fluid was found distending the right lateral ventricle, while the ventricle on the other side was empty. The left hemisphere was of natural consistence and colour.

At the base of the skull it was seen that the left internal carotid artery was standing up, full and round. This was owing to a coherent blackish coagulum which filled the vessel from within the middle lacerated foramen to its termination. The clot thence extended into the ophthalmic, and into the whole length of the anterior and middle cerebral arteries and their branches. The internal carotid was examined outside the skull, and found to be empty and natural. The coats of the cerebral vessels were natural.

The heart was flabby and weak. There was a slight amount of old thickening about the mitral and aortic valves, but no recent vegetations nor any evidence of active disease. There were no coagula in the heart or great vessels, the blood being fluid, excepting in the cerebral arteries.

The lungs were generally congested. At the apex of the left was a circumscribed patch of extravasated blood. There were old adhesions in both pleuræ. All the other organs were natural.

In this case the hemiplegia was not the result of the fluid in the ventricle, for the paralysis was on the same side as the effusion. On the other hand, the hemiplegia was on the contrary side to the obstructed vessels.

The vessels were filled with coagulum on the left side. The right side both of the body and face was paralysed. There was an apparent exception to this in the fact that there was dropping of the left eyelid. This, however, was probably owing to the state of the orbit. The clot had extended into the ophthalmic artery of that side.

CASE II.—Margaret Reid, 43 years old, the mother of six children, was brought to the hospital in an apoplectic fit, November 29th, 1863. She was under the care of Dr. Pitman.

The attack, which was the first that had occurred, was preceded by a feeling of giddiness. She only lived a few hours after her admission. There was no return of consciousness. The left side was palsied ; the right leg was frequently drawn up, and with her right hand she was for ever wiping and rubbing her face. She swallowed with difficulty. Before her death there was much foaming at the mouth. This case is taken from Dr. Sturges' account.

Post-mortem examination.—The dura mater was firmly adherent to the skull ; the superficial veins were distended ; over the centre of the left hemisphere the subarachnoid fluid was faintly tinged with blood for a space as large as half-a-crown.

On section the white matter was generally mottled with vascularity. The ventricles were natural. Close under the surface of the left corpus striatum was a small mass of spongy softening, the size of a hazel-nut ; this part was not altered in colour.

The arteries at the base were obstructed in many places by recent coagula ; these were most abundant in the right hemisphere ; the end of the right internal carotid was filled by a plug an inch and a half in length, which was slightly attached to the wall of the vessel. The surface had become slightly decolorised. Many similar plugs were found in the smaller arteries. They were generally about an inch in length, and manifested a tendency to place themselves on the cardiac side of a bifurcation. The left posterior cerebral was one of the vessels affected. There was no difference in consistence between the two sides of the brain.

The pericardium contained a large quantity of clear fluid. The aortic valves were much altered by old fibroid thickening ; two segments were adherent to each other for some distance. The mitral valve was hard and rigid from old fibroid thickening ; the opening was the size of a button-hole and quite stiff, so that it could have had little or no valvular action. The tricuspid valve was thickened to a less degree. The ventricles were imperfectly contracted. The cavities were examined for recent vegetations or fibrinous concretions, but nothing of the kind was discovered ; the valves were all smooth, and gave no indication of having been the seat of any recent deposit.

A calculus was found in the left kidney, and there was a small polypus attached to the uterus.

In this case, as in the preceding, it is evident that the paralysis was owing to the state of the blood-vessels, not to a small patch of softening in the corpus striatum. The softening was on the same side as the paralysis, while the chief arterial obstruction was on the contrary side.

CASE III.—Sarah Oxford, 23 years of age. The following is an abridgment of her history, as reported by Dr. Sturges. At the age of 13 she had rheumatic fever. She first came into the hospital in Nov. 1862, having been attacked with vomiting and shivering. She was not seriously ill at this time, and soon left in apparent health. The following November she began to suffer from dyspepsia, cough, and difficulty of lying on the left side. She had spat up a little blood ; she again came into the hospital. On examination of the chest the sounds of the heart were found to be rapid and irregular, but there was no murmur ; there were sibilant sounds in the lungs. Under treatment she improved and left the house ; but was readmitted Dec. 23d, with much the same symptoms, and in addition œdema of the legs and vomiting. The face was now bluish and flushed ; the pulse indistinct. Her chief complaints were, pain in the region of the stomach, and vomiting. On the 27th, when she appeared something better, and

while she was washing her face, she was seized with sudden faintness, and never spoke again.

Post-mortem examination.—A large quantity of blood escaped while the skull-cap was being opened. The carotid arteries, as far as they could be followed in the skull, and their continuations at the base of the brain and under the name of the middle cerebral arteries, were distended with black coagulum. The plug on each side measured about two inches in length; it terminated in the smaller divisions of the vessels. The anterior cerebral arteries were blocked up at their carotid ends by branches of coagulum; many of the smaller vessels deriving their blood from the carotids contained small detached coagula. The arteries in connection with the vertebral artery were free. The internal carotid arteries outside the skull were natural, and empty. The external carotid, however, on the right side, was distended with coagulum from its origin at the bifurcation to its extremity. The clot had also extended into the thyroid branch. The brain itself was examined minutely; it was natural in all respects. The coats of the arteries were every where natural. The mitral valve was narrowed by fibroid thickening so as only to admit the point of one finger. The tricuspid was affected in the same way, but to a smaller extent. Upon the surface of the heart were a few patches of false membrane. No part of the heart showed signs of recent disease. Not a particle of coagulum existed in it; the blood was fluid, with the exceptions stated. The great vessels were all empty, and natural in all respects. All the other organs were essentially natural.

The suddenness of the death of this patient was owing to the extensive formation of clot. It was evident that all the coagulum was of the same date, and that quite recent. The patient must have expired almost on the instant of its formation. Cases have been reported in which death, apparently by syncope, has followed the sudden closure of some of the arteries by which the brain is supplied.

CASE IV.—Thomas Brennan, 36 years of age, came into the hospital under Dr. Page, July 4, 1865. It appeared that the man had been recently discharged from the army, and had been tramping up to London from Leeds, the place of his discharge. Near his journey's end he was seized with a fit, and was at once brought to the hospital in an insensible state. When he came under observation on the following day his state is thus described by Dr. Sturges: "He obeys feebly, but is quite unable to speak or protrude his tongue. There is a rigid condition of the muscles of the left arm without total palsy. He has a warm skin; regular pulse of 96. He swallows ill; has a rather flushed or sunburnt face, and an expression of intelligence contrasting strangely with his inability to speak, or otherwise respond to questions. There is no facial palsy." After this the pulse became very rapid, he sweated

profusely; the urine was passed into the bed; and he sunk on the 7th, the third day after the attack.

Post-mortem examination.—The brain was much congested; when cut the white matter became quickly bedewed with blood; the gray matter was dark, the pia mater vascular; the ventricles were natural. The dura mater was generally adherent to the skull. Long black coagula were drawn out of both carotid arteries from the base of the skull. These were not adherent, and were uniformly black. All the large arteries at the base were similarly occupied, so that they maintained a full cord-like shape. The vertebral, basilar, and the posterior and middle cerebral arteries of both sides were thus affected, beside smaller vessels. The coagulum was not quite continuous, spaces being left here and there in which little or none existed. The clot was black and soft, like currant-jelly. The coats of the vessels were all natural. The heart was natural. The valves were healthy. The right ventricle contained a little partly decolorised clot, evidently dating only from the death of the patient; elsewhere the blood was fluid. The cavities were blood-stained. The other thoracic organs and the kidneys were natural. The rest of the abdominal organs were not examined, as the body was wanted for dissection.

CASE V.—Charles Harris, aged 26, came into the hospital Jan. 23d, 1866, under the care of Dr. Pitman. He was a carman, in the habit of drinking beer and gin to excess. For a fortnight before the attack which led to his death, he had been drinking very freely. On the evening of January 17th, at 11½ P.M. he was seized with giddiness. He had no fit, and did not lose his senses.* Next day he did some work, and also a little on the 19th, on which day he took to his bed. At 6½ P.M. on the 21st he was seized with loss of speech, with a feeling of pins and needles in the right arm; these symptoms being followed by loss of power in the right limbs. Consciousness remained unaffected. In this state he continued until his admission on the 23d. He was then unable to speak, but was quite sensible. He expressed with the motions of his left arm the sensation of jerking in the right. The right arm was paralysed, not rigid. The right leg could be slightly used. The muscles of the face were slightly deficient in power on the left side, the face and the limbs being paralysed on different sides. The pupils were unaffected. The motions were passed into the bed. A murmur was detected with the first sound of the heart at the apex. The urine was free from albumen. Pulse 120. At night he was delirious. Temperature in the axillæ from 103 to 103¼, the higher temperature on the right side. He became rapidly weak. The respiration and action of the heart became extremely rapid, and he died on the second day after admission, or eight days after the first symptom. (From Dr. Thompson's notes.)

Post-mortem examination.—The dura mater was vascular, and adherent to a rough patch on the occipital bone. The convolutions were somewhat flatter than usual. The pia mater and brain-tissue were generally injected. There was a doubtful loss of consistence in the white

matter; but this was very uncertain. Drops of water made no impression. The lateral ventricles were natural; each contained about a drachm of watery fluid. There was a firm buff-coloured coagulum obstructing and distending the whole length of the basilar artery, and the adjoining quarter of an inch of the right vertebral. The clot was about $1\frac{1}{2}$ inches long; it was hard, somewhat adherent to the lining of the vessel, and was more perfectly decolorised on its outside than in the centre. There were no coagula in any other cerebral vessels. There was no trace of atheroma or of any change in the coats of the arteries. The heart was rather large, $15\frac{3}{4}$ oz. There was a small old white patch on the pericardium. The mitral valve was thickened, tough, and leathery. The aortic valve was slightly affected by the same fibrous thickening, but probably not enough to interfere with its action. There was no trace of recent endocarditis, or of any fibrinous deposit. All the other organs were essentially natural. There were no fibrinous blocks any where, or any thing to suggest the existence of embolism.

In this case it may be observed that a coagulum of the diameter found, large enough to distend the basilar artery, could not come through any of the vessels (all comparatively small) with which the basilar communicates. It seems evident, therefore, that it must have been deposited in the situation in which it lay.

It is scarcely needful to insist, in the first place, that the coagulum found in these cases in the cerebral arteries was not of post-mortem origin. In two instances the blood was fluid elsewhere—no post-mortem clot existed. Besides this, the appearance of the coagulum in each case varied with the duration of the symptoms. In Case III., where, in consequence of the great extent of the coagulum, death was almost the first symptom, the clot was black, uniform, and soft. No change had taken place in it. In Case V., where the symptoms had lasted for eight days, the clot was firm, decolorised, and adherent. Moreover it was found that when the vessels were plugged on one side of the brain only, there was paralysis on the opposite side of the body, which could not be accounted for otherwise. It is evident also that the coagula had formed where they were found. These were not cases of embolism. There were no vegetations or deposits in the heart, nor were there any fibrinous blocks in the organs. The only vessels affected in any case were the cerebral, and those in connection with them.

A marked difference exists between the long branching coagula found in some of these cases, and the detached fragments, such as are carried from the heart. The latter seldom occupy the cerebral vessels in any length, but stick as isolated masses at the points where the arteries divide.

Allowing, then, that the clots in these cases originated in the cerebral arteries, it becomes a question what could have led to their deposition.

There are, it appears, three different conditions which lead to the coagulation of blood within the living body. The first relates to the character of the blood itself, the second to the rate of its movement, the third to the surface over which it flows.

Firstly, changes take place in the blood itself, which render it apt to congeal. This seems to be the explanation of the coagula which form in the femoral veins towards the close of phthisis, and occasion the œdema of the legs so common in that disease; and of the coagula which form in the veins in phlegmasia dolens.*

Secondly, when blood ceases to move it coagulates. Any thing which retards the movement of blood in a vessel or cavity is likely to lead to the formation of clots. This frequently causes coagulation in the heart and in arteries. The coagula which are found in the auricular appendages, and in the hollows of the ventricular walls, are generally associated with disease of the valve which forms the exit of the cavity in which the clots lie. The blood has become stagnant in some recess out of the way of the partial and impeded current, and has consequently formed a coagulum there. The pulmonary artery is often occupied by coagulum in consequence of the circulation being obstructed by an emphysematous state of lung. The deposit of coagulum in consequence of the closure of a vessel by a ligature is a familiar instance of the same law.

Thirdly, a rough or otherwise diseased surface may have the power of collecting the fibrine from the blood. Hence we get fibrinous vegetations accumulating upon valves pre-

* The dependence of coagula in the veins in cases of phthisis, phlegmasia dolens, typhoid fever, and diseases generally of an atonic character owing to alterations in the character of the blood, is alluded to by Dr. Ogle in vol. vi. of the *Pathological Society's Transactions*, p. 32.

viously roughened by disease, and in the same way fibrine collects upon the lining of atheromatous vessels.

These considerations, especially such as concern the movement of blood, will help in some measure to explain the pathology of the cases related. It appears that in most of these cases two influences have been in operation. There has been disease of the heart—particularly contraction of the mitral opening. This occurred in four of the five cases. The general circulation has thus lost freedom, and a liability to venous and capillary congestion has been established. Besides this, there has been some especial cause by which the cerebral vessels have been overloaded, or the circulation in them disturbed.

The circumstances under which the seizure has happened may be briefly repeated.

A coachman had been out at night with his carriage until half-past three in the morning of a midsummer day. He was attacked on reaching home. The heart was weak and thin; there was old thickening of the valves of the left side. (Case I.)

A tramp walked up from Leeds to London in the month of July; he was attacked on nearing the latter place. The heart in this case was natural; the only case in which it was so. (Case IV.)

A man of intemperate habits was attacked at the end of a fortnight's hard drinking. The mitral valve proved to be thickened, tough, and leathery. (Case V.)

A young woman who had long been invalided by cardiac disease had occasional attacks of vomiting. After an attack of this kind, which was usually protracted, her face was observed to be bluish and flushed, and the pulse indistinct. The seizure followed, and was rapidly fatal. There was extreme narrowing of the mitral opening, less of the tricuspid. (Case III.)

In Case II. the immediate circumstances which preceded the attack were not known; but after death the mitral opening was found to be no larger than a button-hole. The tricuspid and aortic valves were also diseased.

Thus there appears to be, in addition to the defective general circulation, some especial cause to interfere with

the state of the cerebral vessels. In two cases heat and exhaustion. In another case a fortnight of hard drinking. In a fourth several days of frequent vomiting.

The causes which have been described act probably by causing an interruption of circulation in the capillaries of the brain. The blood once at a standstill accumulates and coagulates on the arterial side of the obstruction. On the venous side the vessels are still able to discharge their contents, so that no clots are formed in the veins or sinuses. The coagula may form in a somewhat symmetrical manner in the vessels of each side, or may collect in a median artery like the basilar, in which a comparatively large amount of blood may lie, receiving but a remote impulse through the narrow and winding vertebrals.

As to the symptoms, it appears that a great variety exists according to the amount of coagulum which the vessels contain. Death may, as in Case III., occur immediately upon the coagulation taking place; or that result may be delayed for one or several days. There can be little doubt that where the coagulum is of small extent, recovery is likely.

Where death occurred instantly, the symptoms were those of syncope. Where the change was such as to cause death in one or two days, the symptoms closely resembled those which follow a large extravasation of blood. It does not appear that by our present knowledge we could avoid mistaking such cases for apoplectic seizures. The attacks may, indeed, be strictly so called, if we avoid using the term in its perverted medical sense, by which it is limited to an interstitial outburst of blood. We have all the symptoms which are held to constitute the state described as apoplexy, though no extravasation has taken place. The pathological condition in such cases has been aptly described by Falstaff: "This apoplexy is, as I take it, a kind of lethargy, *a sleeping of the blood.*"

In the cases where the disease has run its course thus rapidly it is not possible to avoid noting the resemblance which they bear to sun-strokes—not only in the symptoms, but in the fact that in one case certainly, and probably in another, exposure to heat, conjoined with prolonged toil, acted as the exciting cause. It would be interesting to learn the

condition of the blood in the cerebral arteries after death by sun-stroke. Possibly the attacks may be found to be associated with coagulation in these vessels.

A striking symptom in the more protracted cases in which the cerebral arteries are obstructed by coagula—whether of the nature here described, or due to embolism—is a peculiar taciturnity. There is either no power of speech whatever, total silence—though the patient at the same time may have an intelligent look and manner—or the power of speech is limited to the use of one or two simple words, which are repeated with good articulation, but without any regard to their meaning. This symptom appears to be of general occurrence, whatever the position of the clot may be.

W. H. DICKINSON, M.D.

XIX. TALIPES VARUS.

TWENTY-TWO cases of congenital varus have been treated in the Hospital during the past two years. Some infants of six weeks and upwards have been treated as out-patients, while others more advanced have been admitted into the house. The most advanced age at which any of these patients came under treatment was eighteen years. In all of these cases the tibialis anticus and the tibialis posticus tendons were divided, and the foot was then gradually everted and brought into the condition of equinus, when the plantar fascia, if tense, was divided, and subsequently the tendo Achillis. In cases of severe distortion, the tendon of the flexor longus digitorum has been divided as well as that of the tibialis posticus muscle. On the third or fourth day after the operation, and as soon as the punctures have healed, a straight splint, extending from the middle of the thigh to beyond the foot, has been fixed on the outer side of the limb; the limb itself having been first carefully bandaged, and gentle traction being constantly kept up, the foot has gradually yielded, and at length been fully everted. When this condition was complete, and the foot was fully extended, the tendo Achillis was divided.

In severe cases of varus it has been found necessary to have recourse to a well-fitting instrument to unfold the transverse arch of the foot and to complete the extension. In an ordinary case of talipes varus, however, such an instrument is unnecessary, and a straight splint, to which the foot is properly bandaged, is alone sufficient to remove this form of distortion, with perhaps the addition of Scarpa's shoe to complete the flexion of the foot. And when the distortion is slight, it is not absolutely necessary to have recourse to such instru-

ments as Scarpa's shoe, but the foot may be replaced in its normal position by means of bandages and a pliable splint only.

The restoration of the shape of the foot depends much more on the complete section of the tendons to be divided than on the application of any peculiar form of instrument for this purpose; and without division of tendons it is rare that a complete and permanent cure of congenital varus can be effected. When the limb is only slightly distorted, the normal shape may occasionally be restored by means of bandages only; but it has occurred to me to have to operate on children whose feet have been bound up on the most approved principles of the bandagists for years even (one of those here referred to had been bandaged and acted on by elastic appliances for three years), without the deformity being influenced in any marked degree; but on dividing the tendons, the foot was speedily restored to its normal shape.

In congenital talipes varus the tibial tendons should in the first instance be fairly divided, and the punctures having healed, extension should be commenced, and carried on slowly. For the purpose of extension a pliable splint may conveniently be employed, first on the inner side of the foot, and afterwards it may be changed to the outer side, and the foot may be bound gently to it. At length, when the foot is fully extended, the plantar fascia (should it be tense), or any process of it, must be divided, and the longitudinal arch of the foot is then to be acted on and unfolded. Not unfrequently a dense band of this fascia contributes almost as much as the retracted muscles themselves to the distortion. It is important that this part of the operation, namely, the unfolding of the longitudinal arch, should be completed before the Achilles tendon is divided, otherwise the os calcis being no longer fixed, it may become difficult to extend the longitudinal arch of the foot. Finally, the Achilles tendon is to be divided, and the foot remains free to be flexed upon the leg.

In dividing the tendons and the fasciæ the knife should be passed beneath the structure to be divided, and the cutting edge being then turned upwards, or towards the surface, the tendon or fascia will be divided transversely. In using the

knife in the reverse direction, or in cutting down upon a tendon, it is difficult to divide the tendon without considerable effusion of blood; but this should, if possible, be avoided in subcutaneous sections.

The time which is necessary for the cure of varus varies according to the age of the patient and the degree of distortion. Each stage of the operation must be completed before the succeeding one is undertaken, or it becomes impossible to produce a perfect result. If, for instance, the tarsal bones are imperfectly unfolded before the foot is flexed, not only is distortion not removed, but the foot is rendered less useful than before the treatment was commenced.

The after-treatment, whether of congenital or non-congenital varus, is of the greatest importance, and the usefulness of the limb depends so much upon it that I would say some few words with regard to it. Passive motion, shampooing, bathing, friction with oils, and galvanism, are to be used freely and frequently, until the joint moves easily and the muscles gain power of action. The removal of distortion is an unquestionable gain; but when a pliable limb is added instead of a stiff joint, of how much greater value is the limb! This very plain and obvious fact is often overlooked, not only after distortion has been removed, but in those cases also where inflammation has subsided, and where, from want of passive motion, the limb remains motionless. In these last-mentioned cases, as in the former, it occurs but too frequently that a limb is allowed to remain stiff and immovable—scarcely better than an artificial limb—because that knowledge which all possess with regard to these facts is seldom enforced.

B. E. BRODHURST.

XX. TALIPES EQUINUS.

IN its literal acceptation, talipes equinus may be said to consist of an elevation of the heel, arising from contraction of the Achilles tendon, unattended by any lateral deviation of the foot. The sole, instead of resting on a plane parallel to that of the ground, forms with the latter an angle varying in degree with the extent of the deformity; but whatever its amount, the long axis of the foot remains the same. In an ordinary or simple case of equinus, occurring at an early stage, or in the young subject, the heel is raised; but otherwise the foot preserves its natural form. At a more advanced period, or under the influence of certain conditions, various modifications are observed.

Equinus is the most common deformity comprised under the general term of talipes or club-foot. Of a total of 450 cases of the latter, which I have collected as having come under my observation, 169 belong to equinus, of which 86 refer to the male, and 83 to the female. And of 153 recorded instances,

41 pertain to the right foot only.			
77	„	„	left „
35	„	„	both feet.

Talipes equinus is sometimes complicated with a deformity of a different kind in the opposite foot. Of five cases besides the above, three were of equinus of the left foot, with varus of the right in the other two, and calcaneus in the third: and of the two remaining cases of equinus of the right side, valgus was found in the left in each.

Pathology of Equinus.—No deviation from the normal state occurs in the origin of the various muscles attached to the leg, but the tendons which succeed them undergo more or less change of position. For the following description, in

all that relates to the relative situation of the tendons and ligaments, the author would refer to two excellent adult preparations in the museum of St. Mary's Hospital; and as illustrating the bones of the foot in this deformity, to some good examples in the museum of Guy's Hospital.

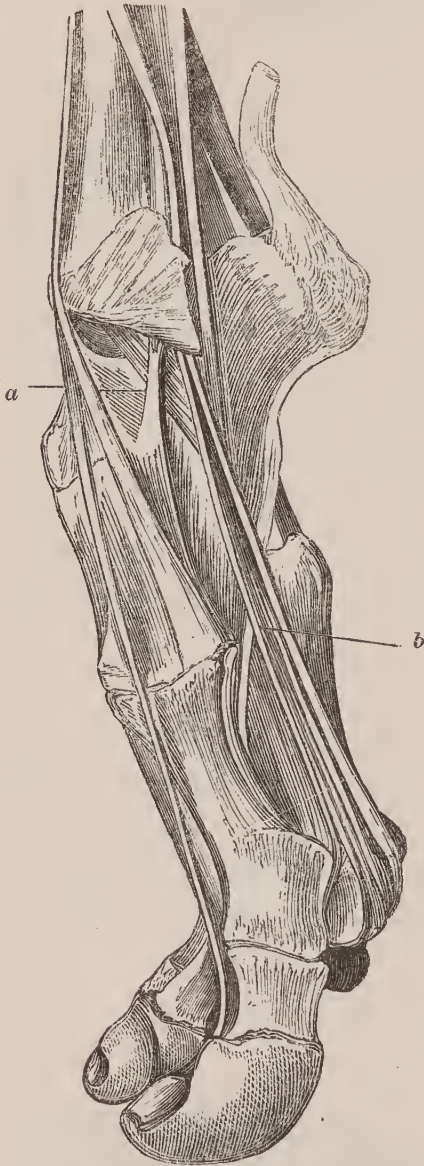


Fig. 1. Front view of a case of Talipes equinus, from a preparation in St. Mary's Hospital Museum.

a Ext. prop. pollicis.
b Flexor longus pollicis.

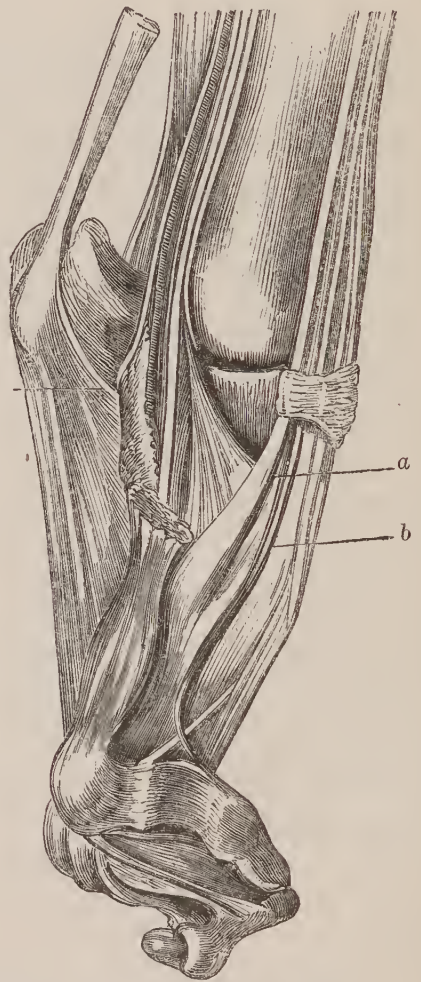


Fig. 2. Back view of same preparation.

a Tibialis anticus.
b Ext. prop. pollicis.

Tendons in front of the foot.—The innermost, or the tendon of the tibialis anticus, is situated in a groove on the anterior surface of the malleolus internus. In its course downward it lies parallel to, but half an inch from the astragalus throughout the entire length of the bone, and is then con-

tinued on the inner side of the scaphoid, and finally close to and beneath the internal cuneiform, into which it is inserted, as well as the base of the metatarsal bone of the great toe. To its outer side is the tendon of the extensor proprius pollicis. Internally, where it touches the scaphoid, it is close to the tendon of the tibialis posticus, at the insertion of the latter into the bone. The *extensor proprius pollicis* tendon, as it passes under the annular ligament, lies close to the upper or articulating surface of the astragalus, near its inner side; it then descends along the line of the tarsus to gain the upper surface of the metatarsal bone of the great toe, to be inserted into its last phalanx. The tendons of the *extensor longus digitorum* and *peroneus tertius* lie on the same plane beneath the annular ligament, resting partly on the astragalus, and in part on the anterior slip of the external lateral ligament. Escaping from beneath the former, these tendons proceed to the outer side of the head of the astragalus, before they separate for their respective destinations. The tendon of the peroneus tertius, in this preparation, is inserted into the metatarsal bone of the fourth toe.

Tendons behind, and to the outer side of the foot.—The tendons of the peroneus brevis and longus soon separate from the fibula, and descend, the former on the outer side of the calcaneum, to be inserted into the base of the metatarsal bone of the little toe; the latter quitting the same tendon behind the tubercle on the external surface of the os calcis, passes underneath this bone and the calcaneo-cuboid or long plantar ligament, to be inserted at its usual place in the great toe. The tendon of the *tibialis posticus*, after passing behind the internal malleolus, where it separates from the long flexor tendon, measures about an inch in length before its insertion into the scaphoid and other bones. At this part it is a distance of five or six lines from the astragalus.

The *anterior annular ligament*, the lower portion of which only is seen, is oblique. Attached to the outer side of the malleolus internus, it passes outwards and downwards over the front of the astragalus to be inserted into the under surface of this bone. Beneath it are only two sheaths; the inner one for the extensor proprius pollicis, the outer for the extensor longus digitorum.

The *external lateral ligament* consists of three parts; an anterior, which is also inclined inwards, to be inserted into the outer side of the astragalus, immediately behind its head; a vertical, very short on account of the proximity of the malleolus internus to the os calcis; and a posterior portion transverse, and extending from the same malleolus to the os calcis. The peronei tendons are not in contact with either of the last-named ligaments.

The *internal lateral ligament* is composed of two parts: first, a short wide band, one portion of which passes downwards and backwards from the internal malleolus to the margin of the sustentaculum tali, and another downwards and forwards to the astragalus immediately beyond its upper articulating surface; secondly, of a narrow strip of tendon having a similar attachment to the internal malleolus, directed backwards, and hooking round the tendon of the flexor longus pollicis between it and the flexor longus digitorum, to be inserted into the sustentaculum tali.

With regard to the bones, I need only mention the astragalus and the os calcis, as the relative situations of the rest are scarcely changed.

The *astragalus* is vertical, and measures rather more than two inches in its long diameter. Its superior articulating surface is thrown farther back than natural, and scarcely extends beyond that part of the bone in front, which is in actual contact with the tibia: its anterior surface is crossed by the annular ligament, and traversed by the tendons of the extensor longus digitorum and peroneus tertius. Towards its inner side this surface is close to the extensor proprius pollicis, and lower down is a well-marked prominence forming part of the head of the bone, which is imperfectly received into the posterior surface of the scaphoid. On the outer side of this projection are the tendons of the long extensor and peroneus tertius, and to it is attached the anterior slip of the external lateral ligament. The astragalus is not visible at all posteriorly, and the tendon of the flexor longus pollicis is therefore contained in a groove on the tibia.

The *os calcis* is inclined at an angle, in this instance about 45° , with the bones of the leg. Its anterior surface is somewhat raised above the level of the cuboid. Crossing its ex-

ternal surface are the long and short peronei tendons, the former passing obliquely along the inferior aspect of the bone. The upper articulating surface of the os calcis is in absolute contact with the tibia, without the intervention of the astragalus, and is crossed by the tendon of the flexor longus pollicis. The internal surface offers nothing remarkable.

Unlike other varieties of talipes, Equinus is most rarely, if ever, congenital. Such, at least, is the recorded opinion of those whose experience is best entitled to our consideration. The deformity may commence, as it sometimes does, a few days after birth, but is generally delayed to the time of dentition, or it may succeed to one of the eruptive diseases of childhood, or the presence of ascarides. In the greater number of instances equinus takes place at an early age, and can be traced to no tangible origin. In after years it may appear as a sequence of rheumatism, in which case, according to Mr. Tamplin, it is the result of continuance in one position. The patient, to avoid pain, instinctively draws the foot into that position which occasions the least inconvenience, and there retains it. Such an example lately occurred at the Orthopædic Hospital, under the care of my above-named colleague, in a lad eighteen years of age, who had rheumatism two years and a half ago, which confined him to bed for seven months: as he recovered he found himself unable to put his feet to the ground, in consequence of contraction of the Achilles tendons. Among other and more direct causes may be named wounds, burns, abscesses, or tumours of the calf of the leg, or in the course of its tendon, or about the ankle-joint. Again, necrosis of the tibia, disease of the hip-joint, terminating in dislocation of the head of the femur on the dorsum of the ilium, are either of them not infrequent causes of equinus; and some of the worst instances of this deformity that I have seen, have resulted from compound fracture of the leg. Lastly, equinus may follow rupture of the tendo Achillis, or contraction of one or both hips, and occasionally it is complicated with hysteria.

Equinus presents great varieties of degree. A frequent form is that known as rectangular contraction. In this kind no apparent shortening is perceived, as the foot rests entirely on the ground; when the patient walks, his stride is observed

to be shorter than natural, and he is unable to take a long march; great difficulty is also experienced in walking upstairs; sometimes the only apparent symptom is pain referred to the ball of the great toe, or the heads of the metatarsal bones, and this is very likely to mislead us. If we examine such a case by retaining the limb in an extended position, as fixing the patella, and then endeavour to flex the foot, it cannot be brought to an angle less than a right angle.

Complications of Equinus.—These may generally be attributed to one of three causes: pressure, paralysis, or spasm. When the weight of the body is thrown on the anterior part of the foot, an increase in width is given to the latter, which remains after the removal of the deformity. A good example of this species of equinus is seen in the accompanying drawing (fig. 3), which occurred in a boy thirteen years of age, who was an in-patient of the Orthopædic Hospital in June last. The equinus, which is confined to the right foot, followed dentition, and he has always walked upon both feet. If we compare this with fig. 4, which represents a cast of the same foot after the relief of the primary complaint, an increased width is still noticed. Fig. 3 also exhibits other changes arising from the same cause: (*a*) shortening of the longitudinal arch, which is in consequence rendered much deeper than natural; the transverse arch is also greater, and in many cases it extends as a narrow cleft to the outer border of the foot: (*b*) contraction of the plantar fascia; this is found as a tight band along the inner margin of the foot: (*c*) coincident with these alterations in form, we may further observe a smooth rounded appearance of the foot on its dorsal surface. In some instances corns will be developed on the extremities of the toes, extending even to the nails, producing great pain in walking, and this condition may be combined with contraction of one of the toes, especially the second, which is on a higher level than the rest, and does not touch the ground. Another complication offered by equinus is contraction of the extensor proprius pollicis, and this is for the most part associated with the rectangular contraction of the foot, to which reference has just been made. The great toe also is raised, and to the eye looks as if it were shorter than natural (fig. 5). Equinus is greatly modified by paralysis.

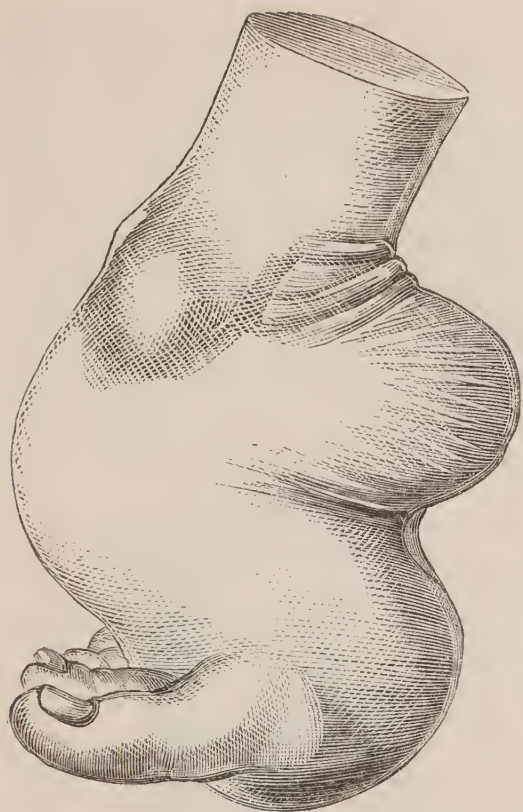


Fig. 3. A case of talipes equinus, to show the shape of the parts in a severe case.



Fig. 4. View of the same foot after successful treatment.

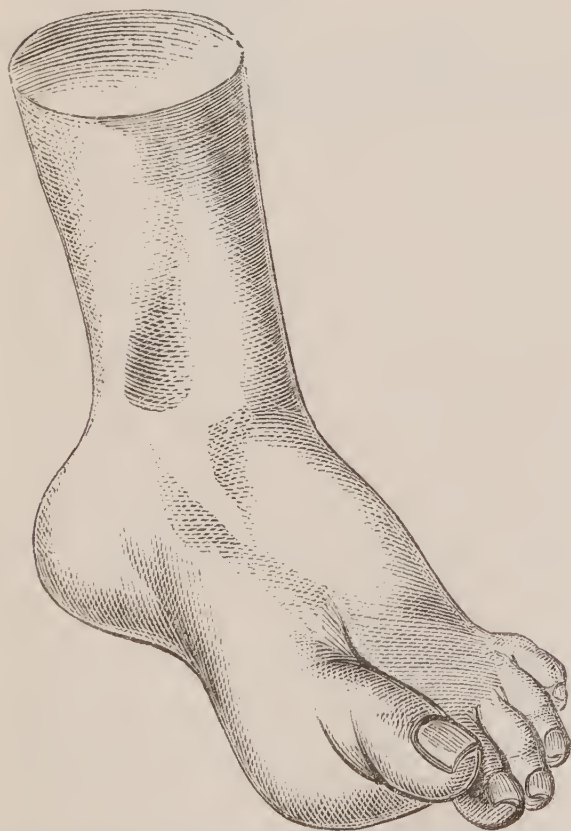


Fig. 5. Contraction of the ext. prop. pollicis, with rectangular contraction of the Achilles tendon.



Fig. 6. Talipes equinus paralyticus.

Now paralysis, by which is understood simply loss of power, may be confined to a single muscle, as in paralysis of the tibialis anticus muscle. The great toe droops, or is bent completely downwards; or paralysis may affect the extensor muscles alone, in which case the patient is still able to bear on the foot, and the toes are bent at a right angle (fig. 6). Again, in complete paralysis, not the least attempt at extension is possible, nor can the patient rest on the foot. And lastly, when entire relaxation of the ligaments is superadded, the foot is supported completely on its dorsal aspect (fig. 7).

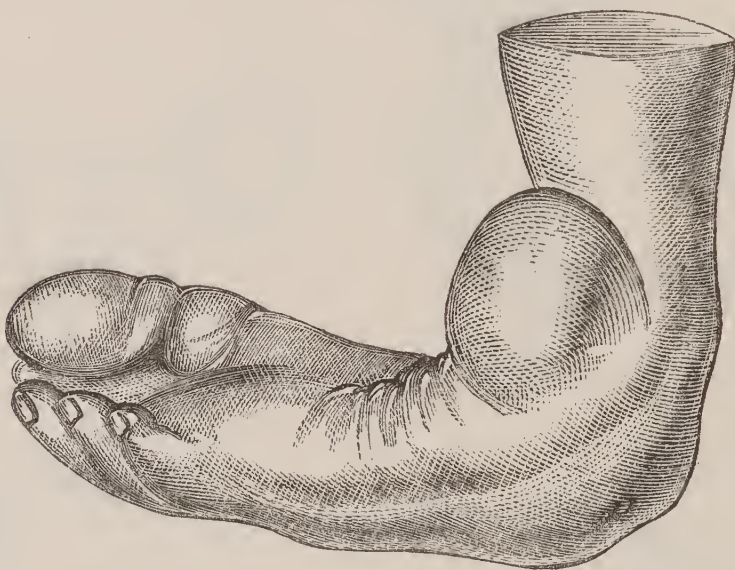


Fig. 7. Talipes equinus paralyticus in its extreme degree.

Sometimes the tibialis anticus is paralysed in both legs. Two sisters were recently in the Orthopædic Hospital under Mr. Tamplin with this deformity, which in each was complicated with rectangular contraction. In walking the feet were thrown forwards in a manner which at once showed a great peculiarity of gait.

Paralysis is largely connected with talipes equinus. Sometimes gradual, it is more frequently sudden in its attack. Although the child is stated to have enjoyed its accustomed health, it will mostly result from inquiry, that for a few days prior to the paralytic seizure, indications of constitutional disturbance have shown themselves. These are often so slight as to attract little notice. The child is put to bed, and the next morning it is found to be quite unable to stand—falls immediately, unless supported. Great pain is sometimes now

referred to a particular part of the hip or foot. Not only is the loss of power complete, but so also is sensation. A few hours after this attack, a decrease is observed in the temperature of the limb, although a general excess was previously noted; and in most cases, concurrent with this change is the commencement of that soft and flabby state of the muscles, which constitutes so marked a feature in paralysis. Such is the ordinary history of this complaint, from which contraction frequently originates. In other cases the attack is induced in the daytime, or there is an absence of all pain. It may be restricted entirely to the lower extremity, or involve likewise an upper, either of the same side or the opposite; but it is most rare to find the paralysis extending to all the limbs. In a large proportion of instances, the influence of dentition is plainly perceived as a predisposing cause. Sometimes it follows one of the febrile disorders incidental to early age, especially scarlet fever, or fits, or intermittent or brain fever; and occasionally it is referred to a fall. The premonitory symptoms are now and then severe, particularly if the paralysis succeed to irritation of the spinal cord, and much pain is felt in the head, as in the following case:

W. R., a strong, healthy boy, aged 4 years and 4 months, was suddenly seized, fifteen months before his admission, with violent pain in the forehead, which, after a continuance of twenty-four hours, was followed by a profuse diarrhoea. This in turn only lasted for a few hours, and then the pain went to the spine, where it remained nearly seven weeks, during which he was confined to bed and unable to move or raise his head without assistance. The skin was also very hot. In the latter part of this time, the right lower extremity became gradually paralysed. The limb was soft, cold, and wasted, and he could not put the foot to the ground. On the 20th October 1862, he became an out-patient, with paralytic equinus of the right foot.

In whatever way the paralysis commences, its progress varies in different cases. Thus, when both limbs are simultaneously affected, one will frequently recover, and that in a few weeks, as denoted by a return of sensation and warmth, but it is not so with the other; sensation is restored, but the loss of power remains, or it is so far recovered that the patient

can bear on the foot, which he drags after him. The part is also cold and flabby. Sometimes the muscles of the spine are likewise involved, and the child is unable to sit up. Again, in other examples, the paralysed limb becomes quite useless, and the patient is obliged to support himself on crutches, while the foot swings like a flail. Such was the condition of the patient in fig. 7, showing complete paralysis of the extensor muscles.

The *prognosis* of equinus is generally very favourable as regards the relief of the deformity, and in cases not complicated with paralysis or spasm, the perfect restoration of the foot may be expected. Where the deformity has, however, followed rheumatism or abscess about the ankle-joint, some degree of stiffness for the most part remains. There is one variety of talipes equinus attended by hypertrophy of the muscles of the calf, on which a guarded opinion should be given as to the probability of ultimate recovery. These cases are rare; but the following instance, which was under the care of my colleague Mr. Adams, at the Orthopædic Hospital, will serve to illustrate it:

A. R., æt. 16, came from Jerusalem to be admitted an in-patient, December 24th, 1863, with equinus of each foot. The contraction was scarcely observed, as when he stood the heels nearly touched the ground. He had great difficulty in walking upstairs, and besides a somewhat shortened stride on a level surface, he was apt to fall at any moment. There was no loss of temperature, nor any of the usual signs of paralysis, in this case, which in most of its symptoms resembled one of ordinary rectangular contraction. The gastrocnemii muscles were unusually large, and when he was discharged from the hospital in the following June, his unsteady gait and liability to fall continued to a certain although less extent.

With respect to the prognosis of equinus where paralysis co-exists, the patient, as a rule, must rest satisfied with partial restoration of the use of the limb, and be content to wear an instrument. With its aid he is enabled after a time to walk, and in many cases to dispense with other means of support. Sometimes, where the paralysis is extreme, atrophy of the limb has also occurred; and although this deformity admits of relief, the leg is relatively shorter and smaller than natural. To this

point I shall afterwards allude, and I need scarcely say, that this condition is permanent.

In considering the *treatment*, it may be stated at the outset, that division of the Achilles tendon is very generally required. Admitting that in the slighter instances of equinus in early life, the contraction may be partially overcome by mechanical means, it is apt to return, even after months of trial, when the appliances are removed. In the rectangular variety, where the heel is on a level with the ground as the patient stands, no amount of mechanical treatment will alone suffice in the adult. Sometimes in the young subject we may succeed with the aid of Scarpa's shoe, independently of an operation; but these cases are the exception, and not the rule. If properly performed, the operation is mostly free from risk, and its necessity further shown by the power to recontract possessed by the tendon long after its division.

In order to divide the tendo Achillis, the patient should lie on his face, at a suitable height from the ground, either on a table or a couch, and if a child, on a pillow; while an assistant places one hand under the leg, and with the other grasping the foot, puts the tendon on the stretch. If the operation be on the left foot, the most convenient position for the surgeon to stand is on the right side of the patient, facing the assistant, who is seated. Having ascertained the precise spot, the surgeon introduces the point of his knife just below the level of the tendon and at its narrowest part, and pushes the blade across the entire width, but is careful not to wound the skin on the other or inner side. With the edge now turned towards the tendon, he slightly depresses the handle of the knife, and with a gentle sawing motion cuts from below upwards. It is recommended also, during this part of the proceeding, to make pressure on the tendon with the forefinger of the opposite hand. When the section is completed, a distinct snap is both heard and felt, and all resistance to the knife ceases; the assistant at the same moment relaxes his firm hold of the foot, which he restores to its original position. Over the punctured wound is to be placed a pledget of lint with a piece of narrow strapping, and then a roller from the toes to the calf. To retain the foot in its proper place, a tin padded splint, bent to a corresponding angle, should be applied

to the front of the foot, and over it a bandage similar to the first. This completes the operation. In older subjects, a second splint is used on the inner side of the foot. The patient is then carried to a chair or bed; in either case the knee being flexed to relax the gastrocnemius muscle, and the foot supported by a pillow. If the right side be selected for operation, the surgeon and assistant should change places—*i. e.* supposing the former intends to enter the knife on the outer side of the tendon. It may be introduced on the inner side; but then the posterior tibial artery is more likely to be wounded. I have found it of advantage in children to have the knee held over the patella; the child in that case can scarcely move the limb. At the end of three or four days, during which time the limb should be kept undisturbed, the lint, bandages, and splint are to be removed, and mechanical treatment commenced. This consists in the application of Scarpa's shoe to the foot, which has been previously bandaged from the toes upwards. The required angle at which the shoe is to be brought is easily obtained by a key, which regulates the movements of a cog-wheel. It is of great importance that the instrument be accurately adapted to the foot, and all undue pressure avoided. After the foot is adjusted in the apparatus, a single turn with the key will be sufficient twice a week, till the foot is brought to little less than a right angle. Where the deformity is severe, it will be useful to have the sole in Scarpa's shoe transversely divided about its middle, and the two parts connected by a joint with a cog-wheel.

The time required for the continuance of the foot in Scarpa's shoe will vary with the age of the patient, the amount of resistance to be overcome, and the attention paid to retaining the foot in its proper position. It may thus occupy three or four weeks, or be protracted to as many months. Unless the parent, or whoever has charge of the child, be cautioned, the latter is very likely to dislodge the heel, which then rises up in the shoe, leaving a considerable interspace. Whenever this occurs, the shoe should be at once taken off and re-adjusted, as when out of its place the instrument no longer acts beneficially.

Instead of the shoe invented in the first instance by Scarpa, and which still bears his name, a more simple and efficient

apparatus has been introduced by Mr. Tamplin as specially applicable to early life. It fits the small foot of the infant or child more perfectly than is attainable by Scarpa's shoe; and to insure support, it is made to extend half-way up the thigh on the outer side. By means of a cog-wheel underneath the sole, near the heel, the movements of flexion and extension are performed.

When the period has arrived that the foot is restored to its natural form, it will be necessary for the patient to wear a boot like that of an ordinary kind, lacing in front, and provided at each side with an iron bar, which reaches to the upper third of the leg. At this part the ends are connected with a semicircular plate, as in Scarpa's shoe, which is lined in like manner with soft leather, and furnished with a strap and buckle. Opposite the ankle, the bars have each a joint with reversed action, which prevents, as far as possible, any tendency in the Achilles tendon to recontract. At this stage passive motion may be employed for five or six minutes morning and evening. It consists in supporting the patient's heel with one hand, while the anterior part of the foot is grasped with the other, and flexion made slowly, gradually, and completely. At night the patient should either sleep in Scarpa's shoe, or wear a tin boot covered with wash-leather; and being provided with straps in front, any elevation of the heel is checked.

A few words will suffice as to the complications of equinus resulting from pressure. In the child, division of the plantar fascia is never needed. With the section of the Achilles tendon, and the return of the foot to its proper shape, the fascia yields. Properly applied pressure, by means of pads on the dorsum of the foot, will fulfil all that is necessary in this respect. Even in the adult the plantar fascia, for a similar reason, seldom requires division. If a case should, however, arise that demands it, a sharp-pointed knife should be passed so as to cut from without inwards towards the skin, and care be taken to divide only the inner band of the fascia. Immediately after the operation, several pledgets of lint should be applied over the wound, supported by the usual roller. This is the most painful operation connected with club-foot. In equinus, which is also accompanied with contraction of the

extensor proprius pollicis, the latter will yield with the restoration of the foot, after section of the Achilles tendon.

Contraction of the second or third toes.—This is occasioned in nearly all cases by the patient wearing a boot or shoe not sufficiently wide in front, and is, especially in girls, a not infrequent complication of equinus. At an early age, or before puberty, it is overcome, and without difficulty, by the following means. Apply a piece of covered whalebone, about half an inch in width, from the extremity of the toe on its under surface, to half the length of the sole, and with a narrow bandage confine it throughout to the foot. By steadily adopting this procedure, and always taking care that enough pressure is made, the toe gradually recovers itself. In some cases, before the application of the bandage, I have further secured the whalebone by strapping it to the toe. In older patients, in whom the flexor tendon is too strong to yield to the above method, it will be necessary to divide it. For this purpose the patient lies on his face, while an assistant endeavours to straighten the toe as far as possible; a pointed and narrow-bladed knife is now introduced between the tendon and the bone, and the section made subcutaneously; the ordinary application of lint and strapping then follows, and after three days' rest, we may commence to extend the toe by the plan which has been already described.

Treatment of paralysis and paralytic contractions.—If we are fortunate to meet with paralysis alone in its very early stage, or within three or four weeks of the attack, a favourable issue in most cases may be anticipated. Should the child be feverish, or suffer at the time from dentition, no remedy can be sought surpassing antimony in small doses, which may be continued as long as the symptoms last. With this treatment at the commencement of paralysis, much benefit will also be derived from mercurial inunction, the best of all modes of administering mercury to a child. Mr. Tamplin relates having once met with paralysis within thirty-six hours of the attack. During the first day the skin was unusually hot; but on the second the temperature rapidly fell. Mercury was given immediately in conjunction with antimony, and mustard-poultices applied to the spine; and before the end of a week perfect recovery took place. In all cases of para-

lysis some stimulating liniment should be well rubbed into the spine and the affected limb, for a few minutes night and morning. And in one that I saw a few days after the seizure, a complete cure ensued, in the course of a few weeks, from the above treatment. At a more advanced stage, or when contraction of the Achilles tendon has occurred, the latter must be divided. The mode of operation differs in no material point from that already described, but the subsequent treatment should extend throughout over a longer period. Thus, instead of three or four days being sufficient for the part to remain at rest after the division of the tendon, a week or ten days will be required. The coldness of the limb is to be lessened as far as possible by such warmth as is afforded by a blanket or by similar means, which are moreover necessary in these cases to promote favourable union, or prevent chilblains, that are otherwise apt to supervene. The after-process of flexing the foot, when it is in Scarpa's shoe, is to be of a slower kind, and once in six days will suffice for the use of the key. When the deformity is at length removed, an instrument of the following description should be worn, consisting of a pelvic hoop, outside and inside irons for the limb, having a stop-joint at the knee, and free joints at the hip and ankle.

In the great majority of paralysed cases the ultimate use of the limb will be entirely dependent upon mechanical support, which during the time of growth is always to be worn. No opinion should be expressed that this aid can be dispensed with, even when growth is complete, although instances do occur which render such an event probable. Mr. Tamplin informs me that in his experience he has met with several examples in which, after puberty, the patient has been enabled to do without the assistance thus rendered; and in one case that came under my notice some time ago, not only could the child walk with ease, still wearing the instrument, but a gradual return to the proper temperature was proceeding from the hip downwards, and had already reached the calf. In an example of this kind, notwithstanding its severity, the prognosis is favourable; and I doubt not that when the child, at present between four and five years old, shall have

completed her full growth, the mechanical appliances may be gradually and finally discontinued.

There is another class of cases, principally met with at a later age, where arrest of the development of the bones has succeeded to paralysis. In these instances, notwithstanding the return of the foot to its natural shape, considerable shortening will have taken place, to the extent sometimes of three or more inches. This condition is occasionally observed when the paralysis extends only from the knee, and is generally associated with genu valgum of the same side. In order to remedy the deficiency in the length of the limb, the patient should be advised to have a cork sole to the boot, of equal thickness throughout; and if genu valgum coexists, besides the pelvic hoop and usual irons attached, the latter must be furnished with a cog-wheel on its outer side and a proper knee-cap, which, under careful supervision, will restore the knee to its proper shape. It sometimes happens, in the course of treatment of equinus, paralytic or otherwise, and while the foot is in Scarpa's shoe, that a lateral deviation takes place constituting equino-varus or valgus, as the case may be. When this complication occurs, the division of the peronei tendons in the one, or the posterior tibial tendon in the other, will be called for, the foot being still retained in Scarpa's shoe, which is accommodated to the angle required by means of the cog-wheel at its side, and afterwards so regulated as to overcome the additional deformity. I have seen this tendency to eversion in equinus corrected, during the time that the latter was under treatment, by a cog-wheel alone on the outer iron, placed near the knee-joint.

Another class of cases, differing from the preceding, is characterised by *spasm*. Spasmodic contractions are often severe. They comprise only a small section of that species of deformity under consideration, and, like those due to paralysis, are *never congenital*. Contractions arising from this cause are recognised without difficulty. In contradistinction to paralysis, spasm generally selects the flexor muscles, and is seldom confined to a single limb. As a rule both feet are similarly affected; and so, in like manner, are the knees, which are bent at a right or an obtuse angle, and occasionally the hips. The

flexor muscles of one of the upper extremities are often involved at the same time; thus, the hand is semi-flexed at the wrist, and the fingers are more or less bent; or again, the spasmodic contraction may exist altogether on one side. In these cases it is not uncommon to find a like spasmodic effect concerned in the muscles of deglutition or speech, or else one of the varied forms of strabismus is superadded. Some impairment of the mental powers is frequently shown. In an ordinary instance of spasm, so great is the contraction of the adductor muscles that the knees cross or touch each other; and in the slighter examples we can mostly detect an unusual rigidity of these muscles near their origin. Should the deformity be at all severe, the patient is quite unable to stand; and if we endeavour to bend or flex the foot, the rigidity is at once felt. The same is experienced in our attempts to extend the knees or hips, should these parts be implicated. There is no loss of temperature or of sensation, or, in early life, any diminution in the size of the limb, except that resulting from disuse of the muscles, which are wholly beyond the control of the will. Support the patient as you may, he cannot guide his feet; and when the arms and hands suffer, he can neither grasp a pen, nor convey food, except by a series of jerks, to his mouth.

Spasmodic contractions often date from teething, or scarlet fever, or one of the allied diseases of infancy, and are gradual or less sudden in their approach than those usually following paralysis. However obscure their origin, they are neither hereditary nor complicated with any peculiar state of health on the side of the parents. The mother frequently attributes this affection to the occurrence of some sudden fright received in one of the later months of pregnancy. The data on which my observations are based are not so complete as to allow any positive conclusion; but I am not prepared to reject the hypothesis of such an origin as wholly untenable. Certain it is that in so far as I have seen, these cases, when severe, are very generally connected with protracted, or difficult, or premature labour. The child is said to have been half dead when born. In one remarkable instance of an infant a few weeks old that I lately witnessed, there was, in addition to contraction of the Achilles tendon and a semiflexed position of the fingers, complete opisthotonos, the trapezius muscles

appearing in strong relief. It had commenced a fortnight after birth.

The prognosis of equinus, when accompanied with spasm, is doubtful. The deformity is indeed capable of removal, but we cannot be sure that the want of control over the muscles, which act independently of volition, will be lessened by an operation. In some severe and apparently hopeless cases I have known great benefit result from operative and mechanical treatment, while in other and less marked instances no visible amelioration has been manifested. In any case, it is a question for the patient or his friends to consider, how far he is likely to gain by a procedure which in its ultimate result may be limited to an improved appearance, and for which he will probably always have to wear mechanical support.

Treatment of spasmodic contractions and their complications.
—In the young subject, and particularly in the slighter cases of spasmodic equinus, much benefit will be often derived from mechanical treatment, such as that afforded by Scarpa's shoe. In other cases, where the spasm is great, it will be advisable, before proceeding to cut the tendon, to modify or control its power. Among the various agents which have been employed for this purpose, few are of more value than the trisnitrate of bismuth administered as a powder two or three times a day, in doses from five to fifteen grains each, according to age. The internal use of this mineral, in disorders pertaining to the great nervous centres, is remarked by Orfila. By its agency, and by antimony, a patient will sometimes obtain sufficient power to walk without assistance. In the section of the Achilles tendon great care is required on the assistant's part, the moment after division, to hold the foot firmly in its former position, or otherwise the knife will cut through the skin, and thus convert a subcutaneous into an open wound. The after-treatment, equally as in paralysis, is to be slowly conducted, and the same mechanical aid will apply at a later stage.

It has been stated that spasmodic contractions of the feet are often complicated with a like contraction of the knees. In such a case our primary endeavours should be directed to unfold the latter joints. For this purpose let a webbing band, five or six inches wide and of sufficient length, be

passed round the inner side of each knee, and then fastened to the bed, and slow traction constantly exercised. At night the patient would do well to use a pad or pillow between his knees, to be increased in size in proportion to their separation. By steady perseverance in this plan for some weeks, the knees will be sufficiently extended to allow the application of the so-called trough-splint, which is adapted to the back of the thigh and leg, and by a cog-wheel can be brought to almost any angle. Sometimes one or more of the hamstring tendons will require division, but in most cases the contraction of the knees can be overcome without; and when this is achieved, the section of the Achilles tendon alone remains.

There is one more class of contractions, not very uncommon, still to be considered; I mean those which arise from pressure on the spinal cord, or, in other words, from *angular curvature*. The equinus in these cases is not an immediate but an after consequence of the primary disease affecting the vertebral column, and is generally attended by contraction of the knees, and commonly of the hips. There is always a rigidity of the muscles, but it is not the rigidity of spasm. Among other symptoms, which participate in its further stage may be mentioned loss of power over the bladder and rectum; but this, equally with a similar condition of the lower limbs, is in most instances regained. These cases, of interest to the physiologist, occasionally furnish a good illustration of the reflex power of the nerves of the spinal cord. The patient, although retaining sensation, is unable to move, until a stimulus has been applied to the cutaneous surface of the thigh, as for example, a pinch, and then he is able at once and for the moment to flex or bend the limb. The degree of contraction which may ensue, as the consequence of the pressure on the spinal cord, is sometimes very great, and in extreme cases I have known it impossible to introduce even a paper-knife between the leg and thigh.

Treatment.—Without entering at any length into the subject of angular curvature, which would involve the consideration of another and a more general question, I may nevertheless observe, that in all cases of equinus having their origin from this cause, our first and chief attention should be devoted to stay the progress of the disease of the spine. With this

view, absolute rest in the horizontal posture is essential. When this is accomplished, extension by the means already referred to may be commenced, to overcome the contraction of the knees, and, if requisite, the hips. At a later period we may proceed to divide the Achilles tendon.

Should paralysis, in other instances, be a final result of angular curvature, the same line of treatment will be necessitated as regards section of the tendon, and the after use of irons to support the limb. A case in point is now under my care at the Orthopædic Hospital of a young man twenty-one years of age, with paralytic equinus—the consequence of a remote injury of the lower part of the spine. So complete was the loss of power, that, on his admission as an out-patient, July 26th, he was obliged to support himself on crutches, with the toes scarcely touching the ground.

GEORGE NAYLER.

XXI. ON THE AMPUTATION-BOOK OF ST. GEORGE'S HOSPITAL,

AND ON SOME POINTS CONNECTED WITH THE STATISTICS OF THREE
HUNDRED AMPUTATIONS THERE RECORDED.

PART I.

ON THE INFLUENCE OF AGE UPON THE RESULTS OF AMPUTATION.

STATISTICS are seldom a popular or an interesting part of medical literature; and as far as they have gone at present it must, I am afraid, be added that they have not proved one of its most fruitful branches. In fact, although statistics have been laboriously cultivated, they have hitherto done little to promote medical knowledge, and still less to guide medical practice. This may have arisen from two causes, viz. either from the use of insufficient statistics, or from the abuse of statistics in applying them to purposes for which they are unfitted. It is but an ungracious task to find fault with our predecessors,—and a dangerous one too for any person sensible of his own deficiencies,—otherwise I could easily illustrate both these propositions by specific instances. All that I will say, however, at present is this: statistics that merely deal with figures—as, for instance, so many amputations, so many deaths—without any thing to connect the two facts together, by explaining the deaths or giving the necessary particulars, appear to me of little use. Nor do I think that statistics are easily applied to solve questions of practice, such as the results of various methods of treatment. The

number of particulars which must be excluded by the numerical method, before the given particular can be selected, is too great for any moderate amount of experience to satisfy. This point has been well elaborated by Dr. Barclay in his well-known work on *Medical Errors*, pp. 38 et seq.

There are, however, some points which a long record of hospital experience seems well adapted to elucidate. Such points do not, indeed, carry with them any appearance of novelty. They are, for the most part, facts which are admitted and familiar, but to which I venture to think less weight is attached than they deserve, because they rest more on general opinion and vague impressions than on absolute proof.

The two main points to which I shall direct the present statistical inquiry are these :

1. The influence of advancing age on the results of amputation.
2. The proportion of cases dying from the effects of previous injury and disease to those dying from the sequelæ of the operation.

The experience of St. George's Hospital in the matter of amputations has been carefully preserved in a Table extending from the commencement of the year 1852 down to the present time, with the exception of one consecutive period of twelve months. In this table, which now comprises above 300 completed cases, are included only the amputations of entire members, the partial amputations of the hand and foot not being brought into account. The table was devised by myself when Surgical Registrar, with the assistance of Mr. Hewett, and was kept by me in that capacity for the first five years. Its headings comprise the name, sex, age, and occupation of the patient, the nature of the amputation, the reason for which it was undertaken, the name of the operator, the dates and result of the operation, and finally such particulars as may be thought worthy of notice, as, for instance, the cause of death in fatal cases (verified by reference to the Post-mortem Book), the occurrence of operative complications, any thing peculiar in the course of the case, the kind of stump obtained, &c.

From these various particulars I propose first to select the

age of the patient, in order to show how great an influence this alone has on the event of the operation.

Every surgeon knows in a general way that all operations, and amputation amongst others, succeed much better in early than in late life; but I do not know whether the fact has ever been brought out so distinctly as by the particulars stated below, which appear to show that amputations, even the primary amputations of the thigh, are by no means grave operations at an early age—that is to say, that, apart from concomitant diseases or injuries, the result may be expected to be favourable; while on the contrary, at a late period of life recovery is the exception.

I have taken the first three hundred cases in our table, all of which are concluded. These three hundred cases may be thus summarised, according to the ages of the patients.

TABLE.					No.	Died.	
Under 5 years					1	0	
Above 5 and under 10 years .					14	1*	
„	10	„	15	„	21	1	4·6 per cent.
„	15	„	20	„	47	8	17 „
„	20	„	30	„	74	14	18·9 „
					<hr/>		
„	30	„	40	„	53	21	39·6 „
„	40	„	50	„	41	15	36·8 „
„	50	„	60	„	34	17	50 „
„	60	„	70	„	13	5	38·5 „
„	70	.	.	.	2	1	
					<hr/>	<hr/>	
					300	83	

Deaths 27·666 per cent.

Under five years of age only one amputation was performed (No. 8), an amputation of the arm, for distortion caused by a burn, in a child three years of age. It was successful, the patient being discharged on the twentieth day.

Above five years of age and below ten, fourteen amputations were performed; of these eleven were of the thigh. In one case the patient died on the second day; but his death was entirely unconnected with the operation. The leg had been torn off at the knee-joint, and the stump of the femur was therefore amputated; but the bladder had been at the same time lacerated by a fracture of the pelvis, so that the operation was necessarily nugatory.

* It will be seen in the remarks which follow that this death was really quite unconnected with the operation.

Of the other ten cases of amputation of the thigh, two were primary, for accident; and in both cases recovery was retarded by sloughing, connected in one case with the injury, in the other with hospital influences (phagedæna). The period of recovery was thirty-nine days in the former case, 104 in the latter.

Of the eight cases in which the thigh was removed for disease, which seems in all cases to have been chronic, the recovery was in one greatly retarded by general strumous disease, under which the child seemed likely to sink, when discharged from the hospital three months after the operation, though he had recovered from the amputation. In two other cases the period of recovery was delayed by scarlet fever, so that the patients remained in the house fifty-five and seventy-six days. The remaining five cases represent more accurately the usual period of recovery from amputation of the thigh at this early age; three being discharged from the hospital in four weeks *minus* a day* (twenty-seven days); one (an older child, on the limits of this class) being detained a fortnight longer, till the forty-first day; and the last case having been attacked slightly with phagedæna, and so not leaving the house till the forty-eighth day.

There were two amputations of the leg; one primary, which was discharged in twenty-three days; the other, for strumous disease of the ankle and tibia, was performed on a very weakly child, whose recovery was protracted over forty-nine days.

The last case was a primary amputation, close up to the shoulder, where the parts, both on the back and front of the chest, were injured and sloughed; the stump of the humerus also became necrosed, and the child was thus kept in hospital for ninety-six days.

Above ten years of age and under fifteen, twenty-one amputations were performed, and of these one died.

The fatal case (No. 52) was in a child æt. 13, whose thigh was amputated for strumous disease, and who died on the twenty-seventh day from phlebitis and pyæmia.

Of the other twenty cases, one was at the hip-joint, for extensive disease of the femur, hip-joint, and pelvis. He was well enough to be discharged in sixty-one days.

Four were ordinary amputations of the thigh for chronic disease of the knee. The average period of recovery was thirty-nine days, the shortest twenty, the longest fifty-four days.

Ten were of the leg: three primary, average duration fifty-five days; seven for disease of the tarsus and ankle, average duration thirty days.

Three were of the arm: one primary, discharged in three weeks; one for incurable burn, discharged in forty-eight days; the other for diseased elbow, retained in the hospital for another disease long after the stump had healed—ninety days.

* I need hardly remind my hospital readers that our operation-day is Thursday, and our usual day of discharge Wednesday.

The remaining two were of the forearm : one primary, discharged in twelve days ; the other for disease of the carpus, discharged in twenty days.

I think thus far our experience shows that below puberty there is little danger *per se* in amputation, since of thirty-six amputations of all kinds only one died from causes connected with the operation. One (No. 87), who died of other concomitant injuries, ought to be altogether excluded, and the number thus reduced to thirty-five.

Nor can it be said that the amputations were of a trifling character, or the patients in a peculiarly favourable condition. On the contrary, the account above given of the amputations in the earlier period (five to ten years of age) show that these were beyond the average of severity of operation, and that the patients were most of them in a very bad condition. In fact, at this early age surgeons do not sacrifice limbs except under the most evident necessity.

The list from ten to fifteen is somewhat more favourable, there being fewer primary operations, and the patients in a less exhausted condition ; but they are, I believe, quite up to the ordinary average of hospital experience.

The operations performed in youth—viz. above fifteen and under twenty years of age—show still a mortality much below the average. The number is forty-seven, eight of which died, but one from a cause unconnected with the operation.

They are thus summarised : of the thigh, one primary and one secondary. The former recovered in forty-eight days, the latter died on the twenty-fifth day of secondary hæmorrhage from the femoral artery.

For disease at the hip-joint, one recovered in twenty-eight days.

Ordinary amputations of the thigh for disease of all kinds, twenty-two : four died, in two cases from pyæmia, on the eighteenth and twentieth day. In both cases the amputation was performed for abscess in the knee-joint, stated to be acute in one case, and probably so in the other. In a third case, death took place from secondary hæmorrhage on the seventeenth day. In the fourth, the patient, a young woman much out of health, sank gradually from exhaustion. The average stay in hospital of the eighteen who recovered was fifty days, the usual period having been exceeded in five cases, from phagedæna, erysipelas, disease of the stump of the bone, &c. The minimum stay in hospital was twenty-three days, the maximum 126.

Of the amputations of the leg, two were primary ; one died of pyæmia on the twenty-ninth day ; in the other case recovery was delayed by sloughing till the ninety-eighth day ; one was secondary, and died of pyæmia on the twenty-first day. Ten were for disease ; all recovered except one, who died of a cause unconnected with the operation—viz. strumous meningitis, on the eighteenth day, when the stump was nearly healed. Two are, at the date of writing this, still in hospital after a very long stay, but convalescent. In both the

operation was done by rectangular flaps. In the other seven cases the average stay was thirty-three days.

Of the amputations of the arm, four in number, three were primary, and one for disease of the elbow. All recovered, the average stay in the house being thirty-four days.

The remaining five amputations were of the forearm: four were primary, and one for disease. In calculating the average stay it seems better to exclude one case (primary), in which the patient had obvious symptoms of pyæmia and osteo-myelitis, followed by disease of the lung and necrosis of the ulna. From all this he recovered but slowly, and was in the hospital nearly five months. The average stay of the other four patients was only eighteen days.

The total number of cases of amputation between the ages of twenty and thirty was seventy-four, and the total number of deaths fourteen. They may be thus divided: thirty-two were of the thigh; of these one was primary, and left the hospital after 111 days, his recovery being retarded by other extensive injuries; three were secondary, two after rupture of the popliteal artery; one of these died of pyæmia on the eighteenth day; the mean stay of the other two was fifty-three days. The remaining twenty-eight were for diseases of various kinds, and of these six died, all of pyæmia. In one, though the stump had healed, the patient when discharged was sinking from phthisis. Excluding this case, the mean stay of the other twenty-one was forty-three and a half days. One was an amputation at the knee-joint, in which recovery was retarded by phagedæna, which attacked the wound when it had nearly healed. This patient remained in the hospital ninety-one days.

Of ordinary amputations of the leg there were twenty-five, and four died; three were primary, one died on the twenty-seventh day of pyæmia. The mean stay of the other two was sixty days. One was secondary; death took place from pyæmia on the ninth day. The remaining twenty-one were performed for various affections; two died, in one case from visceral disease (thirtieth day), in the other from pyæmia on the thirty-sixth day. Their average stay was sixty days.

Of the arm there were nine amputations, with three deaths. The fatal cases were all in amputations for injury; three were primary—one at the shoulder-joint recovered; two, through the shaft of the humerus, of which one died of pyæmia on the thirtieth day. Of three secondary amputations, one died on the second day of pyæmia, which had doubtless commenced before the operation, and another of pyæmia on the thirty-eighth day. The average stay of the six successful cases was thirty-three and a half days.

Of the forearm there were seven amputations: four primary, and three for disease; all recovered. The average stay was $25\frac{1}{2}$ days.

Above the age of thirty and under forty, fifty-four amputations were performed, and twenty-two died. Twenty-two were of the thigh;

one of these was at the hip-joint for tumour, and recovered in thirty-one days. Three were primary; two died, both with pyæmia, on the twenty-third and forty-sixth day: the former had also organic disease of the stomach; one recovered in sixty-two days. Four were secondary; one died in ten days of pyæmia, one in two days of exhaustion; the mean stay of the two who recovered was sixty-days. The other fourteen were common amputations of the thigh for diseases of all kinds. Five died; but some from causes which can hardly be referred to the amputation. In one case the operation was performed on account of arterial hæmorrhage, and the patient never rallied; in a second the patient died of phthisis, causing the stump to slough; in a third, a case of malignant disease, the patient was too exhausted to rally, and died on the thirteenth day; in the other two fatal cases death took place from pyæmia on the tenth and twenty-fourth day. The average stay in the nine successful cases was fifty-one days.

Of the leg there were twenty. Six were primary: two died, one on the third day from the shock of the accident, and one on the forty-first day exhausted by sloughing and hæmorrhage. In one of those that recovered both legs were removed; he remained 89 days in hospital. The mean stay of the other three was 64 days. Two were secondary for injury, both successful; the mean stay fifty and a half days. This leaves twelve cases of amputation of the leg for various affections, of which no less than six died; of these, however, one ought more fairly to be said to have recovered from the amputation, for the stump was healed, when he died suddenly from disease of the brain. In another case amputation was performed as a last resource in hæmorrhage, and the patient never rallied from the previous bleeding. In a third case the patient (who had had the ankle excised) died of phthisis. In three cases death was fairly connected with the operation; two of pyæmia on the sixteenth and fourteenth days, and one of secondary hæmorrhage on the fifteenth day. Of the six successful cases the average stay was thirty-eight and a half days.

Of the arm there were six amputations: one primary, died of sloughing and concomitant injuries; two secondary, one died of gangrene in five days, the operation being performed in consequence of traumatic gangrene, which had suddenly attacked the arm after primary excision of the elbow; the other recovered in thirty-four days. Of three amputations for disease, one was at the shoulder-joint, and recovered in twenty-six days; one for hæmorrhage after ligature of the brachial and other arteries, died of exhaustion after pyæmia (fifty-eighth day). The other recovered in thirty-four days. Of the amputations of the forearm, five in number, three were primary, and two for disease; one of the former died of pyæmia in fifty-two days. The mean stay of the four who recovered was thirty-one days.

Between the ages of forty and fifty, forty amputations were performed, and fourteen died. Of the thigh there were eighteen, and all were on account of disease. Seven died. In one case (for cancer)

with cancerous tumours, as well as pyæmic deposit in the lungs ; in a second, with obscure symptoms of pyæmia on the fourth day, but also with disease of the lungs (no post-mortem examination). In a third, exhausted by the sequelæ of diffuse inflammation, death took place from exhaustion on the sixth day. In a fourth case, the patient was exhausted by cancerous ulceration, and died of exhaustion on the eighteenth day. In the other three cases from causes connected more directly with the amputation, viz. pyæmia on the ninth and twenty-second day, and exhaustion with bed-sores on the thirty-fourth day.

Of the leg there were eleven amputations, with six deaths. In one, a primary amputation, the patient (who was an intemperate man) died of gangrene and concomitant injuries. Three were secondary ; in one (a double amputation) the patient died exhausted in twelve days ; a second died of pyæmia on the twenty-second day ; the third recovered in 120 days. Of seven amputations for disease, one, an intemperate man, with old cough, died of exhaustion in thirty-one days ; the second died of mortification on the twenty-first day ; and the third of pyæmia on the ninth day. The average stay of the four successful cases was thirty-nine and a half days.

Seven amputations of the arm were performed ; two primary, one of which died of pyæmia on the twenty-ninth day ; the other recovered in twenty-seven days. Five for disease ; one died of pyæmia on the eleventh day. The average stay of the other four was thirty-nine and a half days ; the average being raised by one patient, who, being in a state of great debility at the time of the operation, was not well enough to leave the hospital till the seventy-third day.

There were five amputations of the forearm ; one primary. All recovered ; the average stay being thirty-nine and a half days.

Above the age of fifty and below sixty there were thirty-four amputations, of which just one-half (17) proved fatal. Eleven were of the thigh, and of these no less than nine died. The chief cause of this enormous mortality lies in the number of operations for accident which are included in the list, and in the gravity of the cases in those who were operated on for disease. Four were primary operations, and *all* died ; two from the shock of the original injury, one (on the fourth day) exhausted by loss of blood at the time of the accident, and the fourth of pyæmia on the seventh day. One was a secondary amputation, and died, on the third day, of pyæmia, which was most likely developed before the operation. Six were for various diseases, and of these four died ; one was phthisical, and died on the tenth day of exhaustion ; the other three died of pyæmia on the twenty-seventh, thirty-second, and thirty-ninth days respectively. The mean stay in the house of the two who recovered was eighty-nine days.

Two were amputations through the knee-joint. One was in a very feeble and exhausted condition and never rallied, dying on the third day ; the other recovered in thirty-five days.

There were eleven amputations of the leg ; four died. One of

these was for accident; a secondary operation for gangrene after a gunshot wound. Death took place from exhaustion on the sixteenth day. Of the ten amputations for various diseases, three died; one of visceral disease, one of exhaustion (the operation having been performed on account of gangrene following a previous operation on the foot, which had been attended with very copious hæmorrhage), and the third on the twenty-seventh day from secondary hæmorrhage and exhaustion. The average stay of six successful cases was forty days. In the seventh case the date of recovery is not marked.

The amputations of the arm were five in number. One died after amputation at the shoulder-joint for tumour; the cause of death being, apparently, fatty degeneration of the heart; but there was no post-mortem examination. Four ordinary amputations of the arm—one primary, one secondary, and two for disease—all recovered; the average stay being forty-eight days.

The amputations of the forearm were five in number, and two died. One was a primary amputation, and recovered. One of the patients died of secondary hæmorrhage on the thirty-third day, the vessels being diseased. In the other fatal case the wrist-joint had been disorganised by an attack of pyæmia, from which the patient had recovered. It became necessary to remove the hand, but the pyæmia recurred, and he died on the forty-fifth day after amputation. The average time of recovery in the three successful cases was twenty-seven days.

Above sixty years of age and under seventy, thirteen amputations were performed, five of which died. Three were of the thigh, and all died. Death occurred in one case from pyæmia on the seventeenth day; but in the other two from visceral disease, viz. fatty disease of the heart in one case, and disease of the kidneys (with intemperance) in the other.

Five were amputations of the leg, and two died. In one, a primary amputation, the patient died of exhaustion on the twelfth day. The other four were for disease. One died on the third day, having never rallied from the operation. The mean stay in the three successful cases was thirty-nine days.

Two amputations of the arm were successfully performed; one for deformity after burns, and the other for destruction caused by diffuse inflammation. The mean stay was sixty-two days. The forearm was amputated three times with success; one was a primary amputation, the other two for disease. The average stay was forty-nine days.

Finally, above the age of seventy only two amputations were performed, and both these were of the forearm. One was on account of diseased wrist, and the patient (æt. 78) survived. In the other case, which was a primary amputation, the patient (æt. 81) had nearly recovered from the operation when senile gangrene appeared in the legs, and she died on the thirty-eighth day.

If, now, we turn back to the Table in p. 293, we shall see that the percentage of deaths after amputations of all kinds grouped together rises gradually and uninterruptedly (except by fluctuations very easily explained) with advancing years. Under ten years of age, out of fourteen amputations none proved fatal. The fifteenth case stands apparently as a fatal case on the Table; but as the patient died of another injury which was necessarily mortal, the case goes for nothing as one of amputation. In the next five years also, only one accidental case proved fatal out of twenty-one. Yet these thirty-five amputations, performed between the ages of five and fifteen, comprised seventeen amputations of the thigh—one at the hip-joint—and three primary; four primary amputations of the leg, and two primary amputations of the arm, one complicated with injury to the back and chest. During the next five years the rate rises at once from one accidental case out of twenty-one to eight cases out of forty-seven, or one in six nearly; and in the decade beyond this (æt. 20-30) it rises a little higher, but not so much as to show any material increase in the risk of operation.

It is perhaps worth notice that the sum of the operations up to and beyond thirty years of age is nearly equal, there being 157 operations below thirty years of age, and 143 above that age; but the mortality in the smaller sum is fifty-nine, while that in the larger is only twenty-four. In other words, the risk of amputation is constantly rising throughout life, and at any given period after thirty years of age the risk is more than twice as great as it was at the same period after birth.

During the next decade the percentage of deaths is found to have risen nearly to forty; but this is perhaps beyond the average, there being an unusual preponderance in the amputations here noted of operations for accident—seven of the thigh, seven of the leg, three of the arm, and three of the forearm, and several of the deaths in other cases being from causes unconnected with the operation: in fact, in one of the cases classed as fatal, it would be more correct to say that the patient had recovered from the amputation when he died suddenly from latent disease. These accidental circumstances afford a probable explanation of the fact that the percentage

of deaths from the ages of thirty to forty is greater than that in the following decade.

Similarly with the two next decades. Between the ages of fifty and sixty we have thirty-four amputations, of which exactly half proved fatal; but here again it is probable that this is in excess of the average mortality. Thus the enormous mortality after the eleven amputations of the thigh is partially accounted for by the severity of the cases, and by the diseased state of several of the patients. Still it shows how very formidable an operation amputation of the thigh is at this age, and especially for accident. With respect to previous disease affecting the patient, it must be remembered that it is precisely the great frequency of such complications that is one of the main causes of the increased mortality in advanced life. The same prevalence of preceding visceral disease which caused the pathological amputations of the thigh to show so high a rate of mortality is observed to prevail also in those of the leg, arm, and forearm.

The percentage of deaths during the next decade (sixty to seventy) is apparently somewhat less (38 per cent instead of 50); but then the cases are but few—only thirteen in number—and they comprise only two amputations for accident, one of which was of the forearm. It is also to be noticed that all the three amputations of the thigh were fatal, and so was the primary amputation of the leg.

Above the age of seventy amputation is of course very rarely performed, and the larger amputations would be hardly justifiable, except for accident; though even here the prospect of recovery is so slight, that it becomes a question whether it would not be better to allow the patient to die unmolested by operation.

I think these data show incontestably that the patient's age is one of the most important (I had almost said the most important) element in the prognosis of amputation, and that no statistics are complete in which this element is not considered, and allowed its due importance.

Previous statistical inquirers do not appear to me to have given due weight to this very important matter. The only precise details on the subject to which I am able to refer are in Malgaigne's statistical essay on the amputations performed

in the Parisian hospitals, published in the *Archives Générales de Médecine* for April and May 1842. The conclusion to which M. Malgaigne's figures have brought him is quite opposed to our experience. He says:* "In both sexes, during youth the mortality is much less than in childhood. Thus, it diminishes first from fifteen to twenty years of age; then again, from twenty to thirty-five; and lastly, the middle of life, extending from thirty-five to fifty, is the most favourable age of all." But it must be evident to any reader of M. Malgaigne's tables, that they do not represent any thing like the ordinary and natural mortality after amputation. In fact, they were compiled from the Parisian hospitals at a time when the sanitary condition of those hospitals was even worse than at present, and the mortality they display is shocking.† Whatever the causes were which produced that mortality—a question foreign to our present purpose—the fact of such an excessive death-rate is itself sufficient to show that something besides the inevitable danger of the operation was at work there. I do not therefore think that M. Malgaigne's statistics need to be discussed here. Mr. Bryant's statistics of amputation from Guy's Hospital, published in the *Med.-Chir. Trans.* vol. xlii., do not even touch upon the influence of age; and in Mr. Callender's more recent statistics from St. Bartholomew's, in the 47th volume of the same series, though the point is not entirely passed over, yet no great prominence is assigned to it as a practical consideration. Mr. Callender merely gives the results of ten operations performed above the age of sixty-five, together with a table showing the average age of all the fatal and all the successful cases. The latter is as follows:

* Op. cit. 3me série, tom. xiv. p. 62.

† I extract from Nélaton's *Path. Chir.* vol. i. p. 237, the following summary of Malgaigne's table:

		Died.	
Total number of cases	852	332	about 2-5ths.
Amputations of thigh for all causes	201	126	„ 62 per cent.
„ „ for accident	46	34	„ 75 „
„ „ for chronic disease	153	92	„ 60 „
„ „ at the knee	9	7	
	&c. &c.		

It must be remembered that the table includes more than 200 partial amputations of the hand and foot.

	Average age in fatal cases.	Average age in cases ending favourably.
Primary	47	27
Secondary	48	35
For disease	38	32

This is interesting, as bearing on the general conclusions which I am endeavouring to enforce; but it is quite distinct from what is the main point that our experience goes to prove, which is, that, excluding the early years of infancy (as to which we have no data), the danger of amputation goes on rising during the whole of life, and that the main danger of amputation, taking all amputations together as a whole, lies in that increasing exhaustion, or, if the expression be preferred, that diminution of vitality which advancing age brings with it. This diminution of vitality is shown sometimes by a mere general debility ("breaking-up" as it is called), sometimes by a tendency to the secondary complications of wounds, sometimes by distinct functional or visceral affections; but whatever the form in which it shows itself may be, I think there can be little doubt that in cases of similar severity, as far as the injury or disease is concerned, the mortality will vary in the long-run mainly with the age of the patients.

In order to exhibit the same fact by a different arrangement of the cases, as well as to show the percentage of deaths in each form of amputation, I have compiled the following tables.

Primary and Secondary Amputation of the Thigh.

	No.	Died.	
From 5 to 10 years .	3	1	from original accident.
„ 10 „ 15 „ .			
„ 15 „ 20 „ .	2	1	„ secondary hæmorrhage.
„ 20 „ 30 „ .	4	1	„ pyæmia.
„ 30 „ 40 „ .	7	4	„ pyæmia 3, exhaustion 1.
„ 40 „ 50 „ .			
„ 50 „ 60 „ .	5	5	2 from shock of original accident, 1 exhausted by loss of blood in the accident, 1 of pyæmia be- fore operation, 1 of pyæmia after operation.

No amputations of the
thigh beyond this age
for accident.

— —
21 12 57·1 per cent.

Amputation of the Thigh for Disease.

	No.	Died.	
From 5 to 10 years .	8	0	
„ 10 „ 15 „ .	6	1	1 at the hip-joint recovered; the fatal case was from pyæmia.
„ 15 „ 20 „ .	23	4	1 at the hip-joint recovered, 2 deaths from pyæmia, 1 secondary hæmorrhage, 1 exhaustion.
„ 20 „ 30 „ .	28	6	all of pyæmia.
„ 30 „ 40 „ .	14	5	1 hæmorrhage before the operation, 1 phthisis, 2 malignant disease, 2 pyæmia.
„ 40 „ 50 „ .	18	7	1 cancer of lung, 1 exhaustion before the operation, 1 disease of lungs (questionable pyæmia), 2 pyæmia, 1 exhaustion, 1 malignant disease.
„ 50 „ 60 „ .	6	4	1 exhaustion of phthisis, 3 pyæmia.
„ 60 „ 70 „ .	3	3	2 visceral disease, 1 pyæmia.
	<u>106</u>	<u>30</u>	28·3 per cent.

Amputation of the Leg for Accident.

	No.	Died.	
From 5 to 10 years .	1	0	
„ 10 „ 15 „ .	3	0	
„ 15 „ 20 „ .	3	2	pyæmia in both cases.
„ 20 „ 30 „ .	4	2	„ „
„ 30 „ 40 „ .	8	2	1 from exhaustion after sloughing and hæmorrhage, 1 from shock.
„ 40 „ 50 „ .	4	3	1 gangrene and concomitant injuries, 1 exhaustion (double amputation), 1 pyæmia.
„ 50 „ 60 „ .	1	1	Exhaustion.
„ 60 „ 70 „ .	1	1	„
	<u>25</u>	<u>11</u>	44·4 per cent.

Amputation of the Leg for Disease.

	No.	Died.	
From 5 to 10 years .	1	0	
„ 10 „ 15 „ .	7	0	
„ 15 „ 20 „ .	10	1	strumous meningitis.
„ 20 „ 30 „ .	21	2	1 visceral disease, 1 pyæmia.
„ 30 „ 40 „ .	12	6	1 disease of the brain after healing of stump, 1 previous hæmorrhage, 1 phthisis, 2 pyæmia, 1 secondary hæmorrhage.
„ 40 „ 50 „ .	7	3	1 exhaustion, 1 gangrene, 1 pyæmia.
„ 50 „ 60 „ .	10	3	1 visceral disease, 1 exhaustion, 1 secondary hæmorrhage.
„ 60 „ 70 „ .	4	1	never rallied from the operation.
	<u>72</u>	<u>16</u>	21·7 per cent.

Amputation of the Arm for Accident.

	No.	Died.	
From 5 to 10 years .	1	0	
„ 10 „ 15 „ .	1	0	
„ 15 „ 20 „ .	3	0	
„ 20 „ 30 „ .	6	3	1 at the shoulder-joint recovered, all of pyæmia: in one case com- mencing before the operation.
„ 30 „ 40 „ .	3	2	1 sloughing and concomitant in- jury, 1 gangrene.
„ 40 „ 50 „ .	2	1	pyæmia.
„ 50 „ 60 „ .	2	0	
None beyond this age.			
	<hr/> 18	<hr/> 6	33·3 per cent.

Amputation of the Arm for Disease.

	No.	Died.	
From 8 to 10 years .	1	0	
„ 10 „ 15 „ .	2	0	
„ 15 „ 20 „ .	1	0	
„ 20 „ 30 „ .	3	0	
„ 30 „ 40 „ .	3	1	1 at the shoulder-joint recovered, 1 pyæmia.
„ 40 „ 50 „ .	5	1	pyæmia.
„ 50 „ 60 „ .	5	1	the 1 death was probably from dis- ease of the heart after amputa- tion at the shoulder-joint.
„ 60 „ 70 „ .	2	0	
	<hr/> 22	<hr/> 3	13·6 per cent.

I have not tabulated the few cases of amputation through the knee-joint which are included in the records; nor have I thought it necessary to tabulate the amputations of the forearm, inasmuch as death after this operation is so rare that no useful end would be gained by tabulating such operations.

The above tables of amputations, taken separately, show the same result as the previous general statements of all amputations considered together, viz. that the death-rate in each rises with the age. The numbers in each class are so small, that accidental variations cannot but occur. The general result, however, remains equally true.

The period of recovery has also been tabulated; but this is liable to so many fluctuations from accidental circumstances depending on the patient's position at home and the requirements of the hospital, as well as an infinite number of

matters connected with the surgical aspect of the case, and which it is impossible to express in a table, that these averages do not come to any definite result in the small numbers from which they are formed. Still, as it may be a matter of some interest to know what is the usual period of convalescence after some of the main operations, I subjoin the calculations of the stay in hospital of patients after the pathological amputations of the thigh and leg, divided, as before, according to their ages:

Amputation of the Thigh for Disease.

	Average time of recovery in days.	No. of Cases.
From 5 ,, 10 years . . .	49	8*
,, 10 ,, 15 ,, . . .	39	4
,, 15 ,, 20 ,, . . .	50	18†
,, 20 ,, 30 ,, . . .	43	21
,, 30 ,, 40 ,, . . .	51	9
,, 40 ,, 50 ,, . . .	55	11
,, 50 ,, 60 ,, . . .	89	2
None beyond this age.		

Amputation of the Leg for Disease.

	Average time of recovery in days.	No. of Cases.
From 5 to 10 years . . .	49	1 this case exceeded the average period, from the weakly state of the patient.
,, 10 ,, 15 ,, . . .	30	7
,, 15 ,, 20 ,, . . .	33	7
,, 20 ,, 30 ,, . . .	60	19‡
,, 30 ,, 40 ,, . . .	38½	6
,, 40 ,, 50 ,, . . .	39½	4
,, 50 ,, 60 ,, . . .	40	6
,, 60 ,, 70 ,, . . .	39	3

* In these cases the average time of recovery is no doubt higher than it ought to be, being protracted in one case by general strumous disease, and in two others by scarlet fever, which attacked the children during their recovery from amputation.

† In five of these cases the usual period of recovery was exceeded in consequence of erysipelas, phagedæna, disease of the stump of the bone, &c.

‡ The long period of stay in these cases is partially accounted for by there being an unusual number of amputations involving the union of large flaps (as in Syme's and Teale's amputations), and partly by a case being reckoned twice in this class, in which the same patient (who had previously had Syme's amputation performed) submitted to two subsequent amputations in the leg on account of irritability of the stump and indisposition to heal. On both occasions he remained a very long time in the house.

PART II.

ON THE CAUSES OF DEATH AFTER AMPUTATION;
WITH SPECIAL REFERENCE TO THE PROPORTION
OF DEATHS DUE TO CAUSES PRECEDING THE AM-
PUTATION.

THE next branch of our inquiry is as to the causes of death after amputation. In some of the cases the death is inevitable, *i. e.* due to the original injury or the original disease, which did not admit of relief from any operative measure. It is true that in such cases it may be said that amputation ought not to have been performed. This is, however, a matter quite foreign to our present purpose, and in no respect bearing on the question of the intrinsic danger of amputation. It is clear also that the proportion of such hopeless cases will vary considerably in different institutions; that it will be greatest, for instance, in amputations for accident; greater in those hospitals which, being situated near large works, mines, &c., receive a larger proportion of complicated injuries than in the ordinary civil hospitals; and greater in military practice than in any other. The deduction of these cases from the list altogether would be a first step towards a fair comparison of the practice of different institutions.

Then there are other cases in which, though we cannot say that recovery is impossible, yet it is very improbable, in consequence of broken health or visceral disease, and where the death which occurs can hardly be said to be the result of the amputation more than of the previous disease. It is much more difficult to select these cases than those in the former category; yet it is evident that we can have no just idea of the dangers of amputation *per se* until we have made an attempt to separate from each other those cases in which amputation proves fatal though the disease has been wholly removed, and those in which it proves fatal because the disease has not been wholly removed. The former is the case when the general health is unaffected and the viscera healthy; the latter when the patient's constitution is broken down, and he is suffering (perhaps sinking) from disease of the lungs, liver, kidneys, &c.

I have therefore classified the 83 deaths comprised in our table of 300 amputations as follows :

I. From causes unconnected with the operation ; death inevitable.

II. From other causes coinciding with the operation ; the other causes having a main share in producing death.

III. From the operation

By pyæmia.

„ sloughing and phagedæna.

„ erysipelas and diffuse inflammation.

„ secondary hæmorrhage.

„ exhaustion.

distinguishing in each of these latter headings those instances in which the viscera and the blood-vessels were healthy from those in which they were diseased. In some cases the judgment has to be formed from the symptoms during life ; but in most instances there has been a post-mortem examination.

In no instance has the patient died directly from hæmorrhage or other accident during the operation.

TABLE I.*

The first class comprises 14 cases, as follows :

Nature of Amputation.	No. in Amputation-book.	Age of Patient.	Cause of Death.
1. Thigh, primary.	87	8	Laceration of bladder by fracture of pelvis.
2. Thigh, for disease.	59	16	Strumous meningitis, with strumous tubercle of lungs and kidneys. The stump had nearly healed, and there had been no bad symptoms.
3. Leg, for disease.	33	24	Hæmorrhage from another sore, which had become phagedænic.
4. Thigh, for hæmorrhage.	41	32	In a large sloughing wound in the popliteal space a large branch of the popliteal artery gave way. The man was nearly dead at the time of operation, and died from the results of the previous bleeding.

* In all these tables the same arrangement has been followed as in Part I., *i.e.* the cases have been classed in decades of age in the order in which they stand in the Amputation-book.

Nature of Amputation.	No. in Amputation-book.	Age of Patient.	Cause of Death.
5. Leg, for hæmorrhage.	150	30	This was a very similar case. The posterior tibial artery was opened by ulceration, and he never rallied.
6. Leg, for disease.	210	33	This man had absolutely recovered from the operation, and died suddenly from disease of the brain.
7. Leg, for disease.	263	31	Died of phthisis.
8. Thigh, secondary.	258	33	Died in two days with valvular disease of the heart.
9. Thigh, for disease.	15	40	This patient had had chest-disease before, and died in four days of pleuropneumonia. Her chest had been reported healthy before the operation. There was no post-mortem examination. It therefore remains doubtful whether the case ought not to be in the next table.
10. Thigh, for disease.	108	40	Was admitted in the last stage of exhaustion from neglected sloughing, the result of diffuse inflammation. She had not strength to rally, and died in six days.
11. Thigh, secondary.	31	56	He died in three days of pyæmia, which had no doubt existed before the operation.
12. Thigh, primary.	103	54	Died in a few hours from the shock of the accident.
13. Thigh, primary.	123	55	Ditto.
14. Forearm, primary.	202	81	She had nearly recovered from the amputation (of the forearm) when she was attacked by senile gangrene of the legs, of which she died.

If it be conceded, as I contend, that these 14 cases ought to be subtracted from both sides of the list, it would leave us with 69 deaths out of 286 amputations.

In classifying the causes of these remaining deaths according to the data furnished by our amputation- and post-mortem-book, I find that death is due in about an equal number of cases, (1) mainly to causes antecedent to amputation (Table II.), and (2) mainly to causes subsequent to amputation (Table III.); there being 33 cases in which death was caused mainly by previous constitutional affection, or by the results of

the injury which necessitated amputation, or by some other cause not necessarily connected with the amputation.

These cases I have endeavoured to set out as follows :

TABLE II.

The second class comprises 33 cases, divided thus—

A. *Death mainly due to visceral disease, or morbid conditions existing prior to amputation.*

Nature of Amputation.	No. in Amputation-book.	Age of Patient.	Cause of Death.
1. Thigh, for rapidly growing tumour of tibia.	122	19	Previous weak health and hæmorrhagic diathesis. There was alarming secondary hæmorrhage on the eighth day, for which the femoral artery was ultimately tied, when bleeding recommenced from the wound of this ligature.
2. Thigh, for gangrene, after ligature of the femoral for aneurism.	48	27	He had double popliteal aneurism: was an intemperate man, and was suffering from gangrene of one limb after the ligature of the femoral. He was thus in a very desperate condition before the amputation. Death occurred on the eighteenth day, from pyæmia.
3. Thigh, for sloughing and abscesses, the result of old phlebitis after parturition.	289	23	Was in a sinking state before the operation. Died in eight days, of pyæmia. Stones found in the kidney and bladder.
4. Thigh, primary.	83	39	He had ulceration of the stomach from old disease, as well as compound fracture of the opposite thigh. After death (twenty-three days after amputation) pyæmic deposits were found, of which there had been no symptoms.
5. Leg, for disease.	97	35	In bad health, with fatty degeneration of the liver. Died four days after operation, of phlebitis and pyæmia.
6. Thigh, for disease.	113	38	This man was phthisical, with tubercles in the lungs and ulceration of the intestines. He had not power for the union of the stump, which therefore sloughed, and he died of gangrene, twenty-nine days after the operation.

Nature of Amputation.	No. in Amputation-book.	Age of Patient.	Cause of Death.
7. Leg, for disease.	214	39	An intemperate man, with diseased arteries. One of the arteries (the posterior tibial) which had been with difficulty secured at the operation, sloughed above the ligature, causing death by hæmorrhage on the fifteenth day.
8. Arm, for mortification after primary excision of the elbow.	277	32	Primary excision of the elbow had been performed on account of compound fracture, with dislocation of the elbow. This was followed by rapid sloughing extending up the arm, so that it became necessary to amputate near the shoulder. Sloughing rapidly recurred, and he died in six days.
9. Thigh, for extensive malignant ulceration.	1	41	Exhaustion, the result of extensive cancer.
10. Leg, for caries of tarsus.	117	46	Sloughing, the effect apparently of the constitutional weakness of phthisis. No post-mortem examination.
11. Thigh, for cancer.	215	42	After death (twenty-three days from amputation) masses of encephaloid disease were found in the lungs, mixed with pyæmic deposit.
12. Thigh, for diseased knee.	43	51	Sloughing, the effect of constitutional exhaustion from phthisis. Death in ten days.
13. Leg, secondary.	114	55	He was excessively weak and irritable from some constitutional cause, the nature of which was not precisely ascertained, there having been no post-mortem examination. Death from exhaustion in sixteen days.
14. Leg, for cachectic ulceration, with caries of os calcis.	132	57	Fatty heart. Strumous tubercle in the cerebellum. Died of exhaustion in thirty-five days.
15. Forearm, for disease of wrist.	238	53	The vessels were observed to be diseased at the time of amputation. Sloughing took place, and severe secondary hæmorrhage on the thirty-third day, of which she died in an hour.
16. At knee-joint, for epithelioma.	281	55	Was dying at the time of operation, and died in three days, with fatty heart and kidneys, and tubercles in the lungs.

Nature of Amputation.	No. in Amputation-book.	Age of Patient.	Cause of Death.
17. Arm at shoulder-joint, for tumour.	286	59	Died on the fourth day, with symptoms of fatty heart, never having rallied from the shock of the operation. No post-mortem examination.
18. Leg, primary.	38	68	Sloughing from constitutional weakness, producing hæmorrhage and exhaustion. No post-mortem examination. Death in twelve days.
19. Thigh, for abscess in knee.	155	69	Exhaustion from fatty heart. Death four days after operation.
20. Thigh, for disease of knee.	160	66	Was exhausted by long-standing disease and by the consequences of intemperance. He died of exhaustion on the sixth day. Post-mortem examination showed extensive disease of the kidneys.
21. Leg, for disease of ankle.	247	63	Vessels atheromatous. Gangrene of stump. Death in three days.

B. Death mainly due to the general consequences of previous injury.

22. Arm, for repeated hæmorrhage from laceration of the brachial artery in compound fracture.	183	26	He died on the second day after the operation, from pyæmia, and was greatly exhausted by previous hæmorrhage.
23. Thigh, for rupture of the popliteal artery.	299	25	The injury had been inflicted six weeks before amputation. He was in a sinking condition at the time of operation with enormous ecchymosis. He died of pyæmia.
24. Arm, for repeated hæmorrhage, after the ligature of all the arteries of the arm and forearm.	121	38	He was greatly exhausted by repeated bleeding both from the seat of the injury (wound of the palmar arch) and from the various wounds made in tying the arteries. He had symptoms of pyæmia, but sank ultimately from exhaustion on the fifty-eighth day.
25. Leg, primary.	229	38	He was too much prostrated by the shock of the accident to rally, and died on the third day. This case ought, perhaps, to have been placed in Table I.

Nature of Amputation.	No. in Amputation-book.	Age of Patient.	Cause of Death.
26. Both legs, secondary.	285	49	Was greatly exhausted by sloughing, &c., before the double amputation. He died of exhaustion on the twelfth day.
27. Leg, for gangrene after profuse hæmorrhage, in an operation for diseased bone in the foot.	228	59	He was much exhausted by the previous sloughing and hæmorrhage. The sloughing and hæmorrhage recurred after amputation.
28. Thigh, primary.	241	52	Exhausted by hæmorrhage in accident. Death on fourth day.

C. Death mainly due to injury of the parts concerned in the amputation.

29. Thigh, secondary.	300	19	There had been immense ecchymosis, extending up the thigh. Amputation was performed on account of mortification; and this again appeared in the stump, causing arterial hæmorrhage, of which he died.
30. Leg, primary.	204	34	The parts concerned in the amputation were much bruised, and sloughed extensively, the separation of the sloughs being accompanied with much hæmorrhage. He sank exhausted six weeks after the amputation.
31. Arm, primary.	275	30	He had other injuries, viz. scalp-wounds and fracture of the leg. The parts concerned in the amputation had been much injured, and sloughed. He died of exhaustion nineteen days after amputation.

D. Death due mainly to miscellaneous causes not necessarily connected with the amputation.

32. Forearm, primary.	168	35	This patient had recovered, and was so well as to be discharged from the hospital on the nineteenth day, the stump having nearly healed. He celebrated his recovery by getting drunk, was very ill the whole of the following day, and a day or two afterwards had the first symptoms of pyæmia, of which he died fifty-four days after amputation.
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Nature of Amputation.	No. in Amputation-book.	Age of Patient.	Cause of Death.
33. Leg, primary.	233	40	A man of intemperate habits. He had a severe injury of the opposite leg, which sloughed. The stump of the amputation also sloughed, and there was troublesome oozing of blood. He died exhausted fifteen days after amputation.

SUMMARY OF THE ABOVE TABLE.

Out of these 33 cases the direct cause of death was

	Cases.
Pyæmia in	8 Nos. 2, 3, 4, 5, 11, 22, 23, 32.
Secondary hæmorrhage in	4 „ 1, 7, 15, 29.
Gangrene in	8 „ 6, 8, 10, 12, 18, 21, 27, 33.
Exhaustion in	11 „ 9, 13, 14, 16,* 19, 20, 24, 26, 28,* 30, 31.
Shock in	2 „ 17, 25.*

TABLE III.

The third class comprises those cases in which the patient seemed to die of the natural results of the operation, uncomplicated by any amount of visceral or constitutional mischief which could fairly be regarded as the main cause of the fatal issue. This class comprises 36 cases, thus divided—

A. *From pyæmia.*

Nature of Amputation.	No. in Amputation-book.	Age of Patient.	Remarks.
1. Thigh, for strumous disease of the knee.	52	13	Was in weak health from long-continued disease. No visceral disease. Death on twenty-seventh day.
2. Thigh, for abscess in knee-joint.	61	18	Viscera healthy. Death on eighteenth day.
3. Thigh, for abscess in knee-joint.	191	16	A cyst in one of the kidneys. Death on twentieth day.

* It is doubtful whether these three cases ought not to have been placed in Table I., as having been too severely injured to render recovery possible.

Nature of Amputation.	No. in Amputation-book.	Age of Patient.	Remarks.
4. Leg, secondary.	223	17	Death on twenty-first day. No known visceral disease. No post-mortem examination.
5. Thigh, old deformity of limb from strumous disease of knee.	28	21	Death on twelfth day. Viscera healthy.
6. Thigh, for cancer in the popliteal space.	29	25	There was malignant deposit in the inguinal glands, but not in an active state. Death on fifth day from diffuse suppuration in the medullary cavity of the femur, with symptoms of pyæmia. Viscera healthy.
7. Thigh, for abscess in knee.	60	26	Death on eighteenth day. Viscera healthy.
8. Leg, primary.	71	28	Death on twenty-seventh day. Viscera healthy.
9. Thigh, for diseased knee.	30	30	His health was feeble, but the viscera were tolerably healthy. Death on twenty-fourth day.
10. Thigh, for diseased knee.	45	38	Death on tenth day. No post-mortem examination.
11. Thigh, secondary.	66	39	The operation had been preceded by severe sloughing phagedæna. He died on the tenth day of pyæmia. Viscera healthy.
12. Leg, elephantiasis.	68	36	Death on sixteenth day. Viscera healthy.
13. Thigh, primary.	197	38	Death on forty-sixth day. No post-mortem examination.
14. Thigh, malignant disease of foot and leg.	240	38	Death on thirteenth day. No post-mortem examination.
15. Thigh, disease of knee.	18	48	Death on ninth day. No post-mortem examination.
16. Leg, caries of tarsus and ankle.	57	41	Death on seventh day. Viscera healthy.
17. Arm, disease of elbow.	64	42	Was in bad health from bronchitis and broken down by intemperance. Death on eleventh day. No post-mortem examination.
18. Arm, primary.	74	41	Gouty deposit in the joints. Viscera healthy. Death on twenty-ninth day.
19. Thigh, for tumour, probably malignant.	148	40	Death on twenty-second day. Viscera healthy.
20. Thigh, primary.	142	50	Death on seventh day.
21. Thigh, for diseased knee.	162	53	Death on thirty-ninth day. Nutmeg liver. Atheroma of valves of heart.

Nature of Amputation.	No. in Amputation-book.	Age of Patient.	Remarks.
22. Forearm, for disorganisation of wrist from pyæmia.	193	54	Pyæmia recurred after amputation, and she died on the forty-fifth day. There were small vomicæ in the lungs and dilated pelves of the kidneys.
23. Thigh, for abscess in knee-joint.	198	58	Death on thirty-second day. Viscera healthy.
24. Thigh, for old disease of knee.	22	67	Death on seventeenth day. Arteries atheromatous; viscera healthy.

B. From sloughing and phagedæna.

25. Leg, primary.	62	16	The operation was followed by phagedæna. Post-mortem examination showed pyæmic deposits. Viscera healthy. Death in twenty-nine days.
26. Thigh, for diseased knee.	267	23	The operation was followed by phagedæna on the thirteenth day. Rigors occurred on the twentieth, and he died of pyæmia. Viscera healthy.
27. Leg, secondary.	268	21	There had been severe hæmorrhage before the amputation, and he was very low. Two days afterwards the stump began to slough. This was followed by pyæmia, and he died on the ninth day. Viscera healthy.
28. Arm, primary.	269	23	Slight sloughing occurred after the amputation, but this soon stopped, and he went on well till the fifteenth day after the amputation, when he began to have rigors, which recurred daily till the twenty-ninth day; then the stump became black and gangrenous. He died on the thirty-sixth day, of pyæmia. Viscera healthy.
29. Leg, secondary.	280	46	The amputation was performed by rectangular flaps. The flaps sloughed. Pyæmia supervened, and he died on the twenty-second day. No post-mortem examination.

Nature of Amputation.	No. in Amputation-book.	Age of Patient.	Remarks.
30. Thigh, for abscess in knee.	246	50	The stump sloughed. Low pneumonia came on, and he died of pyæmia on the 27th day. The viscera were healthy, but there was caries of the pelvis.

C. From erysipelas and diffuse cellular inflammation.

31. Syme's amputation at ankle for caries of tarsus.	69	25	The attack of erysipelas was followed by pyæmic abscess in the cellular tissue of the neck and general pyæmia. Post-mortem examination showed incipient phthisis.
32. Arm, secondary.	270	24	She had suffered from severe diffuse inflammation after compound dislocation of the elbow. This left so much destruction of parts, that the limb was amputated. The operation was followed by erysipelas, but she recovered from this and went on well till the twenty-first day, when rigors commenced. She died of pyæmia on the thirty-eighth day. Viscera healthy.
33. Leg, caries of tarsus.	146	46	Died on twenty-first day from the effects of diffuse cellular inflammation. No post-mortem examination.

D. From secondary hæmorrhage.

34. Leg, for caries of tarsus.	276	51	Post-mortem examination showed fatty heart and kidneys. There was arcus senilis. He had profuse secondary hæmorrhage, and died on the twenty-seventh day, of exhaustion and sloughing.
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E. From exhaustion.

35. Thigh, for old disease of knee.	292	17	No known disease. Sank gradually more than five months after amputation. No post-mortem examination.
36. Thigh, for sloughing, the result of diffuse inflammation before admission.	239	43	Died in thirty-four days, from exhaustion and bed-sores. Viscera healthy.

SUMMARY OF PRECEDING TABLE.

The direct cause of death was

Pyæmia in	24	cases.
Gangrene and phagedæna	6	} * "
Erysipelas and diffuse inflammation	3	
Secondary hæmorrhage	1†	"
Exhaustion	2	"

These Tables lead to some general conclusions which are, I think, of interest and of practical value as bearing on the question of the intrinsic danger of amputations, and of the risks of the operation when performed in a large metropolitan hospital.

The Tables show, in the first place, that great as we must allow the danger of amputation to be, its apparent danger, as shown by the death-rates, is about twice as great as the real danger; that is to say, that of every hundred persons dying after amputation, the probability is that at least fifty die either because their disease or injury was absolutely incurable, or because the amputation failed to cure it, and it therefore proceeded to a fatal issue. In such cases it is surely illogical to say that the amputation killed them.

Another point to which much and deserved attention has been recently directed is as to the risks of operations (and especially amputations) performed in large metropolitan hospitals. It is a question most difficult to settle, and which has been much obscured by the hasty method in which it has been handled by well-meaning but ill-informed writers, who have jumped to extreme conclusions from mere figures, I do not say not founded on, but certainly not accompanied by, facts. I deny altogether that such figures are useful for establishing a comparison between different institutions. Thus, it is quite possible that a country infirmary may have a death-rate after amputation of the thigh only half as heavy as a metropolitan hospital, and yet the metropolitan hospital may be the more healthy institution, and its practice really more successful. The question cannot be settled without

* Out of these nine cases pyæmia supervened in eight.

† It is very doubtful whether this case ought not to be referred to Table II., as being one in which hæmorrhage occurred in consequence of a diseased condition of the vessels.

knowing many more details than merely "out of so many amputated* so many died." We must know, at any rate, in both cases, the causes of the operation, the age and previous health of the patient, the cause of death, and the results of post-mortem examination.

Now, judging by what has gone before, it seems that almost the only operative complication which leads to death *from* amputation (as contra-distinguished from death *after* or *in spite of* amputation) is pyæmia. The other complications which are usually reckoned as "hospital diseases," are phagedæna, erysipelas, diffuse inflammation, and secondary hæmorrhage. Of course all of these are well known to occur in private practice, and no attempt has ever been made to estimate the relative frequency with which they take place among the same class of patients in and out of hospitals. By reference to our Tables it will be seen that none of them are of much importance as causes of death in cases where there is any fair prospect of recovery from amputation.

Referring to the summaries of Tables II. III., it is seen that secondary hæmorrhage proved fatal only in two cases where the vessels were not known to be diseased, viz. Table II. No. 29, and Table III. No. 34; and in the latter case, though no disease of the vessels was noted at the post-mortem examination, it is most probable that such disease existed, judging from the fatty condition of the kidneys and the presence of arcus senilis at the age of fifty-one. In the other case gangrene had attacked the parts before the amputation, and on a recurrence of the gangrene, some of the vessels were involved. We are entitled to say, therefore, that secondary hæmorrhage is a rare cause of death, and need be taken little account of in cases where the arteries are healthy; that is to say, that in a well-managed hospital it does not occur from hospital influences, but from disease of the tissues.

With respect to erysipelas and its congener, diffuse cellular inflammation, the report is equally favourable. Erysipelas occurred as a precursor of pyæmia in two cases; but the only

* I speak, of course, of the same amputations. The method very generally followed of lumping all amputations together (as if the danger of removing the forearm for diseased wrist was the same as that of a primary amputation at the hip) is too puerile to need observation.

death directly caused by erysipelatous inflammation was Table III. No. 33 (146 in the Amputation-book), when the patient seemed to sink from the effects of diffuse cellulitis.

Phagedæna, or the milder form of hospital gangrene, has been unfortunately prevalent at St. George's Hospital at intervals for a long time, and at least three such prevalences of phagedæna are included in the period over which our notes extend. It is worth while, then, to consider attentively what is the real influence of a prevalence of hospital disease which in this particular must be allowed to be beyond the average. It will be found, on examination, that the only two persons who died after amputation, having had hospital phagedæna, were those marked 25 and 26 in Table III., or 62 and 267 in the Amputation-book. In both these instances (and, in fact, in all the patients in Table III. who had suffered from sloughing of any kind before death) the immediate cause of death was pyæmia. It is impossible, of course, to say that these patients would have had pyæmia if there had been no preceding phagedæna. But however that may be, if we consider these two deaths as really caused by the phagedæna, we must allow that this hospital disease has had very little influence on the mortality.

Thus we come to the conclusion, that in ordinary hospital practice the influence on the rate of mortality of secondary hæmorrhage, erysipelatous diseases, and hospital phagedæna, is very trifling, and that, *cæteris paribus*, the rate of mortality varies with the prevalence of pyæmia.

Whether pyæmia prevails more or less extensively in hospital than in private practice, and whether more or less extensively in one hospital than in another, are questions for which, as far as I see, no materials have as yet been provided towards an answer. Mere figures are quite unequal to this end. We must have facts; and especially we must know more than we now do about the origin, causation, and mode of commencement of pyæmia. For instance, allowing, for the purposes of argument, that pyæmia takes its origin in disintegration of the fibrine thrown out for the union of the operation-wound, is the cause of that disintegration to be sought in the patient or in his circumstances? In other words, does pyæmia usually arise from within, in consequence of visceral

disease, constitutional weakness, or other intrinsic cause in the patient, or is it usually engrafted by some influence acting on the inflamed parts concerned in the wound or injury? These and similar questions must be answered by facts,—by the circumstances and symptoms of actual cases,—not by dry figures. To tell us that in the first of two hospitals twenty patients had pyæmia out of 100 amputated, and in the second only ten, does not prove that the second is the healthier hospital, because the amputations were, for any thing we know, quite different, either in themselves, or in the patients on whom they were practised, or both; and it remains quite possible that if the patients had been interchanged between the two hospitals, the percentages might have been more than reversed.

But to investigate the circumstances under which pyæmia occurs would require a considerable space and a long and careful previous inquiry, and I must postpone this part of the subject to a future opportunity.

It will be sufficient for my present purpose if I have established to the reader's satisfaction, from the notes which represent this long period of hospital experience, the following deductions with respect to amputation in hospital practice:

1. That a considerable proportion of cases must occur in hospital practice in which death is really inevitable, although it is not known to be so at the time of amputation, and that these cases ought to be excluded in estimating the mortality of the operation, as having no bearing on the question.

2. That of the fatal cases which remain, in about one-half death is due mainly to previous disease or injury.

3. That secondary hæmorrhage is hardly ever a cause of death, except in persons with diseased arteries.

4. That death from exhaustion hardly ever occurs without previous disease, obviously proved both by symptoms and post-mortem appearances.

5. That the other hospital affections (erysipelas, diffuse inflammation, and phagedæna, or hospital gangrene) are rare in subjects previously healthy, and that, as a rule, they only prove fatal when they are the precursors of pyæmia.

6. That therefore any attempt to estimate the dangers of amputation in hospital practice, or to diminish its mortality,

must be based upon a knowledge of the conditions under which pyæmia occurs in cases treated separately, and in patients congregated in hospital wards.

Hence the necessity for some careful method of studying the condition of the wards and of the atmosphere of the wards in various states of weather, and at various times of the day and night. It is only by a long series of observations of this nature that the assertions which have been put forth with regard to the origin of hospital diseases from germs present in the air, or deposited on the walls or furniture of the wards, can be verified or refuted.

T. HOLMES.

XXII. STATISTICAL TABLES FROM THE DENTAL CASE-BOOKS OF ST. GEORGE'S HOSPITAL.

THE majority of patients who avail themselves of the dental department of a general hospital are, as a rule, of that class of persons who habitually neglect their teeth, and only apply for relief when suffering and incapacitated from following comfortably their ordinary occupations. The relief they seek must be both immediate and permanent. Statistics from such a source, however, are in one respect valuable as showing the result of disease when allowed to run its course unchecked.

In the dental case-books of St. George's Hospital, 14,046 cases of extractions have been recorded during a period of eight years. Of the whole number, 8708 were permanent, and 5338 temporary teeth.

From one of the following tables we learn that during the summer months there is an increased tendency to those conditions which render diseased teeth painful, necessitating their extraction, or rendering the operation desirable. During the four months, May, June, July, and August collectively, 3108 were extracted, whereas 2839 and 2761 are the numbers for the corresponding divisions of the year.

TABLE I.

The Number of Teeth extracted in the different Months of the Year.

	PERMANENT TEETH.		TEMPORARY TEETH.	
	Male.	Female.	Male.	Female.
January . . .	338	303	191	202
February . . .	336	274	236	224
March . . .	447	396	261	282
April . . .	347	398	204	252
May . . .	444	316	248	240
June . . .	450	404	259	229
July . . .	418	377	206	239
August . . .	353	346	160	194
September . . .	293	352	237	198
October . . .	405	404	234	252
November . . .	355	352	197	243
December . . .	323	277	160	190

TABLE II.

The various Classes of Teeth, and the Number of each Class.

MALE—PERMANENT.

Right.								Left.							
100	242	339	179	137	36	42	29	32	53	50	151	175	315	258	118
131	312	392	110	52	34	17	22	20	25	28	68	112	430	348	152

FEMALE—PERMANENT.

Right.								Left.							
80	182	269	164	125	44	52	27	32	58	47	128	151	248	182	70
124	337	468	123	64	26	16	9	12	29	18	70	114	435	355	140

MALE—TEMPORARY.

Right.					Left.				
101	216	103	141	99	103	143	98	185	95
138	250	84	107	53	65	116	88	262	146

FEMALE—TEMPORARY.

Right.					Left.				
85	211	140	165	96	93	168	119	201	69
125	231	132	148	52	56	128	116	264	146

TABLE III.

The Number of permanent Teeth extracted of each Class.

Central incisors	.	.	.	.	.	183
Lateral incisors	.	.	.	.	.	292
Canines	.	.	.	.	.	283
First bicuspid	.	.	.	.	.	795
Second bicuspid	.	.	.	.	.	1128
First molars	.	.	.	.	.	2896
Second molars	.	.	.	.	.	2216
Third molars	.	.	.	.	.	915
						<hr/> 8708

TABLE IV.

The Number of permanent Teeth extracted at various Ages.

				Male.	Female.
Under 20	.	.	.	1566	1692
„ 30	.	.	.	1417	1463
„ 40	.	.	.	591	518
„ 50	.	.	.	420	259
„ 60 and over	.	.	.	515	267

In the following table all cases in which the diseased condition necessitating extraction was the result of caries are entered under Caries. When the extraction was to relieve a crowded state of the teeth, &c., they are entered under Other causes :

TABLE V.

The Number of Teeth extracted through Caries and Other causes.

	PERMANENT.		TEMPORARY.	
	Male.	Female.	Male.	Female.
Caries	4177	3929	1446	1339
Other causes	332	270	1147	1406

C. VASEY.

ANNUAL REPORT OF CASES

ADMITTED INTO

THE MEDICAL WARDS OF ST. GEORGE'S HOSPITAL
DURING THE YEAR 1865.



DURING the past year 1672 patients have been admitted into St. George's Hospital. Of these, 1446 were discharged, 210 died, and 16 were still remaining at the date of this Report.

The accompanying Table is constructed upon a plan devised in 1851 under the direction of the physicians of the Hospital, and adopted annually from that year till 1859, after which, from some circumstance, the Registrar's Annual Report was discontinued. It may here be briefly explained, that in the Index of Diseases of which this Table is a summary, the cases enumerated in the Patients' Annual Register (a record in which are entered the name, disease, date of admission and discharge of each patient, in a numbered chronological order) are so classified as to present at one view a statistical statement of the relative number of cases under each division. Of the plan upon which the classification is based I have only to say that I have followed, as strictly as I could, the directions which are given by way of preface in the Index itself, and to which I would refer the reader. At the end of 1864 the Medical School Committee directed that every case admitted should be separately reported at such length as its nature required. This has accordingly been done, each case bearing a number corresponding with that in the Index and Register.

It will be observed that in the accompanying Table symptoms as well as diseases are enumerated and take equal prominence; and accordingly in the so-called "complications" of a disease, it becomes necessary sometimes to include some symptom or other which is in fact one of its most characteristic features. Thus hæmoptysis becomes a complication in phthisis, and diarrhoea might have been called a complication of typhoid fever. The plan which seemed most in accordance with the intentions of the framers of the Index, and which has accordingly been followed, is to regard symptoms as "complications" in those cases only where, though usual, they are so prominent as to

modify the course of the disease very obviously, or where they are unusual, and such as we are not in the habit of finding in connection with it.

Dr. Dickinson, the Registrar at that time, in the ninth and last-published Report, that for 1859, has been at the pains to count up the number of admissions under each heading during the whole period of nine years, with the death-rates. In continuance of this labour it may be of interest, in spite of the interval between his report and mine, to state in the case of some diseases the percentages of mortality, and some other particulars of a statistical kind derivable from our ten years of observation. It is not proposed, however, to estimate the percentages for the chronic diseases, since this rate is influenced by too many accidental causes to make its calculation of any value. Of the Table itself, it may be well to add that it is framed under instructions, and that it only professes to be a statement of the more prominent ailments for which a certain number of individuals were under treatment in 1865.

But while it has been necessary to enter under some name more than 1600 cases of illness, it is not to be forgotten that the view taken of disease in the wards is often found elsewhere to be either an erroneous or a very limited view. I think, therefore, that in the few remarks it will be my duty to make, it will be better to review those cases of which we have the entire history than to trouble the reader with statistical observations founded upon different degrees of evidence, of the relative value of which he has no means of judging. Leaving the Table, therefore, to speak for itself, I shall occupy myself chiefly with those cases which were examined after death, and which have interest either from the obscurity of the diagnosis or the nature of the pathological appearances. In all instances the number of the case alluded to will be given, so that reference may be made to the clinical notes for details, which it is beyond the scope of this Report to supply.

Fevers.—Under this heading seventy-eight cases of continued fever are included, viz. nineteen of typhoid and fifty-nine of typhus fever. Some cases of an ill-marked type, and which might with more accuracy have been placed by themselves as simple continued fever, have been classed under typhus.

Typhus was communicated to patients admitted into the hospital for other diseases in five cases, one of which died (169). A servant of the hospital also, the superintendent of night-nurses, died of the disease. Two out of the nine fatal cases were admitted in an almost moribund state; in a third, granular degeneration of the kidneys was found. Two cases of typhus (neither of them fatal) presented marked similarity in their symptoms to meningitis, and were only discriminated from it in the sequel.

Scarlatina.—Forty-one cases of scarlatina were treated. One of these (123), a girl admitted for chorea, had the disease communicated to her in the house. Of the four fatal cases, one (755) was that of a

child aged nine, who died fourteen days after admission of acute pleurisy, when the characteristic symptoms of scarlatina had disappeared. Another (1278), a lad of eighteen, was admitted in a dying state with extensive sloughing of both tonsils. The third fatal case (which ought not in strictness to have been included) arose from scarlatinal dropsy in a child of seven, four weeks from the first appearance of the fever. The remaining case was a boy of eighteen, who was not examined after death.

In the ten years of which we have a record, 1237 cases of continued fever occur, and 172 of scarlatina. The mortality from the former is over eleven per cent, and from the latter over ten per cent.

Measles.—Of seven cases of measles, two were attacked in the hospital.

Erysipelas.—Erysipelas, mostly of the face and head, was fatal in one instance out of twenty-three cases. The patient (119), a woman aged fifty-two, was quite unconscious on admission, and died in a few hours. The most marked post-mortem appearance was great congestion of the whole tissue of the brain. In another case (379) erysipelas occurred to a man while in the hospital for rheumatism.

Rheumatism.—Rheumatism occurred acutely* in forty-nine cases, fifteen of which were complicated. Three deaths occurred (1169, 1217, 1221). The first, which was complicated with pericarditis, was a woman of twenty-nine, who had not before had rheumatism. Pain had almost disappeared, and the heart's sounds were nearly natural at the end of the third week. Some three weeks after, when she was up and about, return of pain in the shoulder and knee was complained of, and some præcordial uneasiness. Very shortly after, while walking across the ward, she fell down, made one or two gasping respirations, and died. In this case the mitral valve was found to be thickened by soft, loose, ragged deposit, which did not appear to be recent. The anterior flap of this valve was perforated by a small hole with thickened margins. A small fibrinous plug was found in the left middle cerebral artery.

The second case (1217) was a man of twenty, of very temperate habits, admitted on the fifth day of his third attack of acute rheumatism, a whizzing systolic murmur being audible at the heart's apex. Delirium set in on the night of admission, and continued till death, on the following day. The examination showed a partially adhering pericardium, with recent lymph between the unattached surfaces. The mitral valves were thickened. "Lymph" was found in the spleen and kidneys. The brain was examined, but no embolism was discovered (the post-mortem examination of this case may be referred to at folio 257 of the Post-mortem and Case Book). The third case (1221), like the first, was suddenly fatal. The patient was a woman of twenty-

* The smallness of this number as compared with former years may arise from the fact that only marked cases of rheumatic fever, where all or nearly all the joints were affected, have been classed as acute.

eight, who had been vaguely ill with cough and chronic pains for three months, but without previous history of rheumatism. A rough systolic bruit was heard at the heart's apex, and, it was thought, exocardial friction sound. Two days before death slight strabismus was observed, and there was complaint of double vision. In this case deposits were found on the mitral valve, as well as a small perforation of one of its flaps. A loose plug of fibrine occupied, without quite filling, the left middle cerebral artery. It was of a light buff colour, not adhering to the walls of the vessel. There was a fibrinous block in the spleen.

One hundred and seventy-three cases of chronic rheumatism include three fatal cases. One of these (169) was a man of sixty-three, who exhibited the symptoms of continued fever fifteen days after his admission, and died of that disease at the end of the second week. Another (1469) was a woman of thirty-eight, who gave a history of seven days' pains in the hands and wrists. On admission there was no apparent swelling, and but little constitutional disturbance. Death happened suddenly and unexpectedly, preceded for a little by venous colour of the face, strange restless manner, and at last coma. The only marked morbid appearance was cerebral congestion. No disease of the heart existed, nor could any plugging of vessels be discovered.*

In the third case (1641) the patient was a lad of twenty-one, who had been subject to rheumatism for four years, and had distinct valvular bruit; orthopnoea came on suddenly, and was as speedily followed by death. The cardiac valves were found to be thickened and leathery, and old false membranes adhered to the pericardium. The head was not examined.

Sub-acute rheumatism is stated to have occurred in 111 cases. It may be presumed, however, that under this heading are placed some instances of pain of which the nature was not clearly made out. The one case marked as fatal (420) was that of a girl admitted recovering from rheumatic fever, and who continued to improve during the first week of her stay. Subsequently the acute symptoms returned with very rapid and exalted action of the heart, a loud blowing murmur being audible towards its apex. From this the girl had sufficiently recovered to be able to leave her bed, when death occurred suddenly by way of syncope. On examination after death, the mitral and aortic valves were found lined with fresh vegetations, and much thickened by old endocarditis. Fluid to a large amount was present in the left pleural cavity, compressing that lung. The brain was not examined.

Poisoning.—Passing the next division, which does not include

* This patient, the day before her death, when upon low diet and deprived of her usual stimulants (of which she was prone to partake freely), was exposed to fright from a woman dying in the next bed; a circumstance which deserves mention in view of the post-mortem appearances being insufficient to account for death. See Post-mortem and Case Book, p. 323.

any fatal case, an instance of œdema of the glottis depending on necrosis of the thyroid cartilage may be alluded to under the heading "syphilis." The subject (375) was a stout-built man, who had been before in the hospital for a secondary eruption following a primary syphilitic sore contracted sixteen months before. On his admission the laryngeal symptoms (dyspnœa and stridor) had been urgent for three days. He died a few hours after he had been warded, no operation having been performed for his relief. Here, in addition to considerable œdema of the mucous membrane of the larynx, it was found that the thyroid cartilage was in part separated from the perichondrium by a small amount of pus. The portion of the cartilage thus exposed was quite continuous with the rest, with no exfoliation.*

Dropsies.—Of some of the cases of dropsy mention will be made under the diseases of which this condition was a symptom.

Hæmorrhages.—Among the hæmorrhages it will be noticed that three entries of hæmaturia occur which are stated to be without complication. These refer to the three several admissions of the same patient. His case is described by Dr. Dickinson in the forty-eighth volume of the *Medico-Chirurgical Transactions*, under the name of "intermittent hæmaturia." Hæmoptysis is mentioned as a cause of death in three instances (686, 785, and 1086). Two of these cases were examples of phthisis where bleeding was repeated and considerable. The third (785) is of interest, inasmuch as the hæmoptysis, which was profuse and uncontrollable, was not due to any thoracic disease, but appeared to depend on granular degeneration of the kidneys. The patient was a painter, of sober habits, aged forty-two. He had suffered from dyspnœa and cough for many years, and an attack of continued fever occurring six months before admission had still further weakened him. He had long had distaste for food, and frequent vomiting. He had not, however, relinquished his employment, and it was on his road to it that he was seized with the bleeding, which continued more or less till his death, seventeen days later. He was said to have suffered from what was vaguely called "gout," but there was no distortion of the fingers or toes. Crackling râles were heard over the posterior chest, and anteriorly the left infra-clavicular space was thought to be comparatively dull. This, with the hæmorrhage, and the absence of disease of the heart, led to a diagnosis of pulmonary phthisis. The pulse was not frequent till shortly before death, and coincidently with its rise the sputum became of a chocolate or rust colour. Remedies had little effect on the hæmorrhage, under which the man rather rapidly sank. As stated already, the kidney disease was not accompanied by any other affection. There was no trace of tubercle; the mucous membrane of the small tubes was deeply congested and spotted with petechiæ. The kidneys were striking examples of the dwindled granular kind.

Hæmatemesis occurring in one fatal case (685), dependent on ulceration of the stomach, will be mentioned under that disease.

* See Post-mortem and Case Book, p. 77.

Purpura.—Death occurred in one case (218) of three admitted, where purpura existed along with many other diseases.

There was no case of scurvy.

Anæmia.—Anæmia, which in former years has been made to comprehend "debility," is used here to signify the condition of pallid bloodless women mostly free from organic disease and benefited by iron tonics. Chlorosis is included under the same heading, according to the spirit of the Index, as being anæmia complicated with amenorrhœa. Under "debility" are placed some cases where that symptom could not be traced to its cause.

Cachæmia.—Cachæmia (following the plan of former years) has been made to include pyæmia. Of this four fatal cases occurred (222 not examined, 382, 409, and 535), not calling for special notice.

Scrofula.—This section indicates cases in which the strumous diathesis was strongly marked, though there wanted evidence of tubercular deposit in any organ. It also includes one fatal case of general tuberculosis, and one, not fatal, of diseased hip-joint.

Tubercles.—Pulmonary phthisis was fatal in 24 cases out of 103, most of that number having reached an advanced stage of the disease on their admission. Two cases of death are placed under tabes mesenterica. Both were dropsical. In the first case (434, a boy of nine) the general symptoms resembled very closely the anasarca following scarlatina, and in the absence of any evidence from the urine, which could not be obtained, were generally, I believe, referred to the kidneys. After death the small gut was found to be thickly studded with tubercular deposit, the mesenteric glands being similarly affected, though to a less extent. In the second case (1236), a man of forty, where ascites was supposed to depend on cirrhosis of the liver, there was found a hydatid abscess of that organ, together with tubercles in the peritoneum.

All the cases of meningitis appear under the heading of tubercle, and all were fatal. Three of these occurred in young children (aged two, three, and ten respectively), and were recognised by characteristic symptoms. In the case of one child (182) strabismus was the first symptom noticed, and no further development of the disease occurred till some weeks later. In all three there existed more or less facial palsy, though in two the amount of it was slight.

A fourth case deserves more particular notice from the obscurity of the symptoms at first. The subject of it (818) was a remarkably fine young woman, aged eighteen, whose previous health had been perfectly good. She had been complaining for a week of sick headache, and for three days before her admission had had frequent vomiting, mostly of a bilious kind. The bowels had continued regular as usual. When this girl first came under observation, the skin was cool and pulse quiet, she was much distressed by the continuance of vomiting and by headache, giving one the notion of a person suffering from a mere bilious attack. On the third day after ad-

mission, however, pain became very violent, and on the fourth, extreme restlessness came on, with occasional delirium. At this time the face was flushed, skin hot, but moist, tongue red, with a whitish fur, there was no strabismus, the pupils were natural, and contracted readily, the pulse, which was quite regular, beat only 68 in the minute. Some days after, the rate of the pulse became quickened and its rhythm undecided. It was not till near her death, ten days later, that partial ptosis of one eyelid was observed. She sunk into coma, and very gradually died. On examination of this girl's brain, the lateral sinuses were found to contain much clear fluid, the substance of the brain in contact with which was softened. There was recent lymph at the base and numerous minute specks of tubercle, the brain generally being much congested. A few miliary tubercles were found in the lungs. Almost the same description in every particular, so far as the brain is concerned, would apply to the next case (751), where also the diagnosis was doubtful at first, the symptoms for some time resembling very closely those of continued fever.

One other case of meningitis, in which no diagnosis was attempted, remains to be noticed (1416). It is that of a man of thirty-seven, of whom no precise history could be obtained. He was said to have been ill for ten weeks with fever, and to have had a fit ten days before admission, followed by right hemiplegia. Of himself he could give no account. He had much the pose and manner of one narcotised by alcohol. There was no palsy, and the features were quite symmetrical, though the tongue was protruded to the right side, the breath was foetid as from mercury, and the tongue creamily furred, the pulse was 56, the face and forehead were hot, in marked contrast to the temperature of the trunk and limbs. The man would complain, when questioned, of frontal headache. The urine was free from albumen. During the next day he appeared less sluggish in mind, and even got up voluntarily to pass water, but he was still drowsy and indifferent. In the following two days he sunk back into semi-consciousness, the face became much flushed, and there appeared to be lax palsy of the right arm; the pulse continued full, distinct, and not frequent. Death was preceded by a slight epileptiform seizure. The disease here appeared to have its origin in the body of the sphenoid bone, the right half of which was rough and honeycombed, insomuch that a small probe could be passed from the sella turcica into the right nostril. A thick layer of lymph was found in the neighbourhood of the pons, optic commissure, and the inner ends of the fissures of Sylvius; the dura mater at the base was vascular and closely adherent. Besides the presence of cretaceous cicatrices at the apices of both lungs there was no indication of tubercular disease in the viscera.

In this place may be mentioned the case of a girl (381) aged 18, whose health had failed coincidently with the first appearance of the catamenia two years before. Menstruation had commenced suddenly, and been very profuse. At that time she was a patient of the Brompton Consumption Hospital, the wasting which occurred being

supposed due to general tuberculisation. During the seven months preceding her admission to St. George's she had become much emaciated, though it did not appear that she had been troubled greatly by cough. The cause of her being brought to the hospital was that she had lately fallen into a vacant melancholic state of mind, refusing to take food or to answer questions. This condition had lasted five days. When first seen she was greatly emaciated. She regarded those about her with a vacant stare, and could with difficulty be got to speak—except that rarely she made wild statements of acts of robbery, &c. The bowels were rather loose, the motions being passed unconsciously, the pulse was threadlike, but not frequent, the tongue moist and reddish, there was a harsh dry state of skin. The physical signs, on examination of the chest, gave no positive indication, the diagnosis remained matter of doubt. After a few days the indifferent vacant manner gave place to incoherent impassioned talking. At this time a vaginal discharge, described as of purulent character, commenced. Epileptic fits now succeeded, and lasted, with very short intermissions, nearly to the time of death, which took place nine days after her admission. The autopsy in this instance revealed a condition which, so far as I know, had not been previously suspected. The bowels were matted together by old adhesions; the right ovary was developed into a large cyst, which contained tubercular pus. Between it and the rectum—to which it adhered—was a hole of communication as big as a pea. Tubercular matter occupied the cavity of the uterus. By search, a single crude tubercle was found in one lung. Part of the right lung (this was the side on which she lay during the convulsions) was in a state of red hepatitis.

Morbid growths.—Passing now to the division “morbid growths,” the case of a young woman aged 30 (1408) may be briefly alluded to, whose remarkably bloodless, almost cadaveric aspect, coupled with the absence of any source of hæmorrhage, as well as of any persistent symptoms directly referrible to the stomach, caused the nature and seat of the disease to be very generally mistaken. The age of the patient, and the want of what has been called the “malignant aspect,” helped, I suppose, to obscure the diagnosis. The history given was of sudden attack of debility six months before admission, together with occasional vomiting and pain after food. Along with this came rapid fading of colour from the cheeks and lips. The bowels had been very costive during the whole time. Mere debility had at last become so extreme, that for two weeks the woman had kept her bed. The remarkably blanched appearance (which indeed rendered the tongue and lips of the same hue as the rest of the face), a distinct systolic bruit, loudest towards the apex of the heart, together with frequent complaint of pain, not fixed, but generally in or near the right hypochondrium, with no corresponding tenderness or resistance on pressure, were the main features to be observed. Though she had a great aversion to food, and could only with great difficulty be got to take nourishment by the mouth, there was seldom any actual vomiting.

The patient sank very gradually, dying from mere exhaustion after twenty days' residence in the hospital. Some time before her death a drop of blood was placed under the microscope, and exhibited a marked excess of white corpuscles, and I think the case was generally regarded as one of leucocythæmia. The post-mortem examination, however, revealed malignant disease of the encephaloid kind, involving the stomach at its cardiac end, but not extending to the œsophagus. The liver and neighbouring glands participated to some extent, and the kidneys were slightly "amyloid."

It may be mentioned here that fourteen cases of abdominal tumours were admitted during the year, of which the nature was uncertain.

Hysteria.—Among the 41 cases of hysteria admitted, one may be referred to, from the somewhat unusual character of the symptoms, and the benefit which resulted from treatment. This girl, aged 18 (374), who was plump and florid, was brought into the hospital in a state of considerable agitation, breathing with much difficulty, and with a stridulous sound closely resembling that which belongs to laryngitis. Moreover, the left hand was tightly clenched, and that arm firmly flexed in such manner as to bring the knuckles against the left breast, where indeed, by long pressure, a sore had been produced. In addition to this, one foot was turned in to an extent which would have been thought hardly possible in a sound limb. The patient had been suffered to remain in bed with all these symptoms and many others for twenty-nine weeks, the parents being unaware of the nature of the disease. Hysterical symptoms seemed to have commenced about the time of puberty. The catamenia had been regular, though scanty. Hæmatemesis had often occurred, and since the age of 13 she had had frequent fainting-fits. These, indeed, as it turned out, were brought on upon any attempt being made to meddle with her. By the daily use of galvanism, or perhaps more by the effect produced by the girl's dread of that remedy and her efforts to avoid its application, by keeping her employed (for the first time in her life) and out of bed, and by making light of her symptoms, a cure was effected in this case in less than a month.

As a rule, it may be said that cases of hysteria derived no benefit from treatment in the hospital.

Ten cases were admitted of persons supposed to be merely hypochondriacal.

Chorea.—Of twenty-eight cases of chorea admitted, nineteen were girls and nine boys. In the case of the four girls who were over the age of puberty, the oldest being nineteen, the affection was associated with hysteria, and along with it went some irregularity of the menstrual function. Of the remainder, eleven were between eleven years old and seven, and four were under seven. Owing to the ages of the patients, it was not always possible to obtain a history. In three of them rheumatism co-existed at the time of admission. In two girls acute pain (referred in one case to the hip-joint (1310), and in

the other to the heart (349), the nature of which was mere matter of conjecture), was followed in a day or two by chorea. In both the pain was of extreme violence, and in both it subsided suddenly on the appearance of the chorea.

In this place may be mentioned the case of a girl of twenty-two (included, perhaps wrongly, under the heading "hysteria"), afflicted with half involuntary twitching of the muscles of the face and neck (something after the manner of chorea), accompanied by a short barking sound. The patient obtained no benefit from treatment. The case, which has many points of interest, is numbered 1541.

Diseases of Brain and Spinal Cord.—Under diseases of the brain and cord occurs cephalitis, taken here to signify marked congestion of the cerebral substance. Three such cases were examined: the first (119) is the one already alluded to as dying, after some hours, by coma following erysipelas of the face. The second (1469) has been also mentioned under rheumatism, where death (also preceded by short coma) was sudden and unexpected, and supposed due in some measure to fright. In the third case (1553), besides the congestion, there existed a large amount of fluid in the lateral ventricles—a condition, in fact, like that which has been named serous apoplexy. The patient (aged 46), a man of robust frame and sober habits, had for some time been the victim of despondency, owing to failure in his business. From this cause, indeed, he had lost energy and spirits, and may be said to have been, in a vague sense, out of health. A week before his admission, when sitting in a chair, he had a fit of unconsciousness, from which he recovered without any palsy. From this he gradually sank into the state in which we first saw him. His condition then, with sharp, pinched, dusky features, extreme restlessness, and wild terrified expression, might have been taken as indicating delirium tremens or continued fever; to the latter disease, indeed, it had a further resemblance from the tympanitic distension of the belly. Respiration was rapid, thoracic, and catching; the skin damp, tongue quite dry, pulse small, 120. There was no inequality to be noticed in the face or pupils. The legs below the knees were inflamed and superficially ulcerated, the result of the application of mustard at the time of the fit. From the presence in the urine of a distinct trace of albumen, the man's state was referred by some to disease of the kidneys. He never rallied, or became sufficiently conscious to give any connected account of himself. The urine had to be drawn off daily. The motions were passed unconsciously (not in great quantity). He continued watchful and restless till his death, on the third day from his admission, and the tenth from his first seizure. The day before he died, the calves of the legs began to slough extensively. Besides the morbid appearances observed in the brain, viz. considerable congestion and distension of the lateral ventricles, there was nothing in the body to account for death.

Epilepsy.—Some cases of epilepsy will have to be mentioned under the headings of the diseases which give rise to that symptom.

A case may be alluded to here where obscure head-symptoms, with partial paralysis coming and going, preceded death by five years. The history may be given in short from the notes taken when the man was first admitted.

"The patient (771) is a compositor and reader, aged 47. He has been in this hospital before for slight failure of power of the right side. That attack commenced nearly five years ago with violent delirium. The palsy-symptoms gradually subsided in about two years, leaving him in his usual health. The present attack commenced seven weeks ago. Melancholy and avoidance of society were the first symptoms noticed; and he complained, when questioned, of violent pain (intermittent) at the top of the head. He became very drowsy also, and would often start in sleep. Sometimes he was thought to wander in his talk. A difficulty which he found in sitting down unassisted he ascribed to weakness of the right knee, and general failure of power in that leg." In the account of symptoms it is stated: "His manner is taciturn and somewhat sullen; yet he answers all questions pertinently. His general appearance is healthy. The pupils contract equally and readily. Pulse is 60; skin, tongue, &c. not unnatural. Though he states that his right side is the weaker, no difference is appreciated in comparing the pressure of the two hands. There is no drawing of the face. The evacuations are sometimes passed under him." He remained in this state for a long time; the chief thing to be remarked in him being his stolid taciturn manner, and, as time went on, a slight drawing down of the right corner of the mouth, from which saliva dribbled. He obeyed sometimes, but rarely spoke. The loss of power of the right arm became more obvious, with tendency to rigidity of the biceps. He very gradually sank, becoming very feeble, scarcely moving his limbs, and not heeding. At last he fell into a stupor from which he could not be roused, except to eat. So he died after long lingering. After death, a history was obtained of the patient having struck his eye (right or left?) violently with an umbrella. The wound was described as severe, and was supposed to correspond with a scar over the right eyebrow. The accident occurred a short time only before the attack first mentioned. It appeared at the necropsy that the frontal bone immediately beneath the scar was rough and nodular, with an opening leading into the frontal sinus, and two or three smaller ones communicating with the inside of the skull. The dura mater in connection with the diseased bone was thick and roughened, and inseparable from the anterior part of the left hemisphere. In this situation was a tumour the size of a plover's egg depressing the convolutions. This mass had the appearance of inflammatory deposit, being hard and yellowish, like indurated pus or lymph. The brain-substance in its neighbourhood was softened.

Paraplegia as the result of disease of the chord may be shortly illustrated by two fatal cases. Both were young men. The one (496), a clerk, aged 26, had enjoyed good health till ten days before his admission, when, with no other sign of illness, he became conscious of

some feebleness in the lower limbs. Six days from that time he was perfectly palsied as to his legs. Before paralysis had become complete he began to feel great difficulty in micturition, and the bowels ceased to act. Of his previous history it appeared that a year before he had bubo, followed by some skin-eruption. He had not perfectly recovered his health since. When admitted, he was very lean, his manner was composed and intelligent, the pulse 120, skin not noticed as unnatural. There was perfect loss of power of the lower limbs. The bowels had resumed their action, but it was necessary to empty the bladder daily with the catheter. He was nineteen days in the hospital without much change in these symptoms (the sensibility of the palsied limbs was impaired, but unfortunately no accurate notes were made of the amount or extent of this defect). Vomiting was very easily excited. He took little nourishment, and wasted. The pulse continued frequent. No mention is made of any pain. The patient preserved his cheerfulness and intelligence. Suddenly, after complaining of acute pain in the region of the bladder, he fell into unconsciousness, and so lay for several hours, when he died.

Here the central part of the chord was found partially softened and dotted with points of extravasation. The greater portion of the cervical chord was natural, but at its lower end were points of effused blood in the white matter. The gray matter in the same place had a yellowish tinge. These appearances became more marked in the dorsal region, in the lower part of which was a small spot of purplish discoloration belonging to the gray matter. A little lower than this, and for the remainder of its course, the chord resumed its natural appearance.

In the other case (401) the patient, aged twenty, was a painter, who for two weeks had had symptoms of numbness in the legs, followed in four days by dribbling of the urine and inability to void it in a stream, and in five days by total palsy and insensibility. The lad attributed the illness to his having been shortly before exposed to wet. Two months before the paralysis he had had an attack described as "pleurisy." The face was rather full and pasty, and about the trunk was an abundant eruption of brownish unraised patches. From this appearance, notwithstanding the patient's strenuous denial, syphilis was suspected, and his having had a sore throat a year before (though this was afterwards shown to be in connection with scarlatina) was regarded at the time as some confirmation of that diagnosis. On his admission he had total want of sensation as high as the level of the umbilicus, and he described the "numbness" as gradually creeping up day by day, so that at the end of five days it was found to reach as high as the xiphoid cartilage. There was no great constitutional disturbance, though the pulse was frequent. The lad preserved an intelligent, natural manner. His decline was very slow and lingering; he often spoke of startings of the palsied limbs; bed sores appeared, and he wasted considerably; at one time cough was very troublesome. The line which marked the upper boundary of the insensibility was

supposed to shift occasionally. The patient died after seven weeks of suffering, in possession of his mental faculties till the end.

In this case a mass of tubercle was found in the centre of the chord opposite or a little below the third dorsal vertebra. It was as large as a small marble, and wholly replaced the central portion of the chord. There were some miliary tubercles in the lungs, mostly of old date.

A case with remarkable symptoms, ending in paraplegia, will be found recorded at some length at No. 410. The subject of it, a boy of ten, was discharged as incurable after three months' residence. Only a very imperfect outline of the case can here be given. The child, who had something of the strumous aspect, was admitted in a prostrate and bemoaning state, with highly flushed face and rapid pulse. The skin, however, was not hot, nor was respiration notably hurried. He was very unwilling to be moved, or even touched; the bladder was greatly distended, and it was found necessary to draw off its contents. There was a raised blister near the right heel, which shortly developed into a large bulla. The history was merely, that he had lain in this state for the last five days, having been put to bed for complaint of pain down the right side. During this time the urine had only been passed by drops; there had been no vomiting, and the bowels had continued regular in action. He had never been known to be out of health before. Some time elapsed without any marked change occurring in this boy's state, except that the tenderness which he had first shown on being moved increased to most marked hyperæsthesia, and another small blister appeared on the abdomen. The bladder acted very imperfectly. The exalted sensation was most marked over the cardiac region; here slight pressure gave him the most extreme distress. Afterwards tenderness was most acute in the arms, so that the lightest touch was not borne. Meanwhile, though the pulse continued over 120, the skin was not unnatural, and the aspect did not differ much, except for a habitual expression of pain, from that of health. The bulla on the soles of the feet became very large; the urine still came by dribblets. Ten days after admission some strabismus of the right eye was noticed, and occasional photophobia. At the end of a month's residence the symptoms of paralysis became more pronounced, he would pass his motions sometimes involuntarily, and began to lose power in the lower limbs. As paraplegia advanced, the exalted sensation disappeared, the pulse also decreased in its rate, and, though he wasted considerably and had night-sweats, active disease seemed to have ceased. He was discharged perfectly palsied in the legs, and quite without control over the sphincters.

Diseases of Heart.—Fourteen cases of pericarditis were observed, and six of endocarditis. All save one (of which there was no history) were associated with rheumatism. In five cases the heart-affection came on after the patient's admission.*

* I have not much confidence in these numbers; because, first, cardiac complication, though not present on the patient's admission, may yet have happened by the time the case comes to be registered; and secondly, because pericardial friction may

Out of forty-nine cases of acute rheumatism, thirteen had heart-complications. Out of 111 subacute cases, ten had heart-complications.

In entering twenty-six cases as hypertrophy, and eight as dilatation of the heart, it is only meant that in that number of cases respectively these conditions existed to a very marked extent. It is not supposed that all the patients admitted with enlarged or dilated hearts have a place in the list.

Amongst diseases of the heart the following may be mentioned :

A stout healthy-looking man, aged forty-two, of sober and active habits, was admitted for symptoms which were referred to dyspepsia, the chief of which was epigastric pain, increased by food, but unattended by vomiting. During his short stay in the house he on several occasions had attacks, during which he would stand quite still, with his elbows raised, and remain in that position till "the pain," as he called it, subsided. He was anxious to be up and dressed, that he might be prepared for such seizures. An examination of the chest gave no clue to the nature of them. One afternoon, after dinner, when dressed and in his usual health, he rose suddenly from his seat and, with an alarmed expression of face, complained of the old sensation at the epigastrium. He then became blue, was slightly convulsed, and in a moment or two dead.

Here it was found that the openings of the coronary arteries were encroached on by soft atheroma to such an extent as almost to close them. The muscular fibre of the heart was not fatty to any extent, and the other organs were quite natural.

This case, along with some others of angina, is mentioned by Dr. Dickinson in the last number of the *Pathological Transactions*.

Diseases of Blood-vessels.—We come next to diseases of the arteries and veins. During the year nine cases of aneurism were either recognised during life or detected after death (cases of slight dilatation of the aorta without a sac not being included). Three of these were thoracic tumours, whose nature was at once recognised. They were not fatal in the hospital, but it cannot be said that they derived benefit from treatment there. The other six cases all died in the hospital. One was aneurism of the innominate, fatal suddenly by producing spasm of the glottis. In a second, aneurism of the ascending aorta existed, along with hypertrophy of the heart and diseased kidneys. The true nature of both these cases was suspected during life. There remain four cases, three of cerebral and one of abdominal aneurism, all fatal by rupture, and none recognised by symptoms. Each may deserve a short notice.

No. 1114 is the case of a married woman, aged forty-six, who was admitted owing to stoppage of the bowels of four or five days' duration, and vomiting of food and bile. Previous to the stoppage, she had been subject for an indefinite time to wandering abdominal pains and back-

be present for a few hours only in the course of acute rheumatism, and be altogether overlooked by the Registrar.

ache. She also described an attack of severe spasm as having occurred eight months before. For some time preceding the constipation the bowels had been loose. The woman was very prostrate. She had a furred tongue and tumid tympanitic belly. An oil enema was given, and brought away a loose motion; after this the bowels were acted on without difficulty by mild purgatives, and the abdomen became soft and yielding. Still the patient continued lethargic and miserable, complaining of spasms and various ill-defined sensations, after the manner of women of her class—the victims of chronic dyspepsia. Declining at last to take drugs, she was about to leave the hospital by her own request, when, on the morning of her intended departure, she suddenly became cold and collapsed, and after remaining in that state some hours, died.

I am not aware that the cause of this unexpected event was so much as conjectured, till, on post-mortem examination, an aneurismal sac was disclosed, situated about three inches above the bifurcation of the aorta, consisting of a large irregular cavity with broken walls, which, by its rupture, had given rise to an enormous extravasation behind the peritoneum.

Another patient (1599), a woman of forty-three, was admitted with ptosis of the left eyelid, and outward strabismus of that eyeball. The face was otherwise quite symmetrical. There was no palsy elsewhere, and no marked alteration in sensation, though some numbness was felt at times in the limbs of the left side. The woman complained of great pain over the left half of the head, no particular spot being indicated. For the rest, she was well nourished, and in respect of her general health not greatly disturbed. The history was sufficiently precise. She said that nine weeks before, when at her washing, she had a fit of total insensibility of two hours' duration, followed by some numbness of the left arm and leg. Nearly recovering from this, a second similar fit occurred seven weeks after the first, succeeded by intense headache and much vomiting. Hitherto symptoms of palsy had been confined to the sensation of numbness in the left limbs, but after a third fit, which happened in a day or two from the second, the left upper eyelid was observed to droop, nor had it recovered its power when a fourth fit occurred, ten days before the patient's admission. After this last seizure articulation was for some hours thick and difficult. The drooping of the eyelid gradually increased to perfect ptosis, and the right eye came to squint outwards. The exact character of the fits could not be ascertained. This woman, who was not required to keep her bed, had a slight seizure of an epileptic character six days after admission, and during the next two days two others of a more serious kind, during which she lay comatose and stertorous, but without convulsion or palsy. From the last of these she recovered sufficiently to answer questions languidly. A third attack of the same sort ended in death. Here, on post-mortem examination, a large quantity of recent black clot was disclosed in an uniform layer at the base of the brain and about the pons Varolii. This proceeded from a

ruptured aneurism of the left middle cerebral artery of about the size of a bean, in close connection with the left third nerve, which had been flattened by its pressure. (See Post-mortem and Case-book, No. 351.)

Case No. 272 has features of resemblance to that just quoted, inasmuch as the symptoms were referrible to the pressure of the sac; it differs from it in being fatal indirectly, without rupture, as a consequence of such pressure. The patient was a potman, aged forty-three. Though sober of late years, he had formerly been a great spirit-drinker. He dated his first symptoms a month back, when, on ascending stairs, he felt what he called a "panting in his chest," and dyspnoea. Soon after this he got cough and sense of constriction of the chest, so that he had to leave his work. Returning to it, however, three days back, he had a fit with perfect unconsciousness while carrying the beer. Three days later (the night before admission) he again attempted to resume his occupation, and again he had a seizure similar to the first. Besides the above history, the signs which led to the conjecture of aneurism were chiefly negative. No bruit or abnormal dulness on percussion could be detected. The heart's sounds were natural, although the second was noticed as indistinct. It was observed moreover that the right radial pulse was very feeble and of small volume, contrasting strikingly in these respects with the left pulse. This patient, who managed to get about, and ate well, and whose chief complaint was of teasing cough, excited no apprehension, till one afternoon he was suddenly seized with spasm of the glottis. Laryngotomy was performed without loss of time, but the man was dead almost before the completion of the operation. The aneurism in this case sprang from the anterior aspect of the innominate artery. It was about the size of a swan's egg, and had displaced the pneumogastric and recurrent nerves of the right side. Its walls were thin.

The subject of the last case to be mentioned under this heading lived less than a day in the hospital (268). He was a shoemaker, aged thirty-seven, of steady habits, seven years married. It was mentioned that he had had acute rheumatism eight years before (which was the only illness known to have befallen him), and that on the day preceding the attack which ended in his death his friends had noticed an unwonted exhilaration and enjoyment of life in him. It was on the night succeeding (four days, that is, before his admission) that he was awakened by purging and vomiting. These symptoms subsided partially during the next forenoon, but at one o'clock he had a convulsion-fit, and five others in quick succession during the day. The symptoms then remitted, and for the next two days nothing was observed save the prostration which the attacks had left. On the third day, however, when in bed at four A.M., he was again convulsed, and on the fit subsiding sensibility did not return; he was then brought to the hospital. Here, when put to bed, he lay regardless, and restlessly moving about his right arm. The face was void of expression, and the eyelids closed. There was an obvious rigidity about the muscles of the left arm, but the power of movement was not lost, though it was seldom

exercised. The pupils were equal, and there was no facial palsy. The man when meddled with would shift his position slightly, as if conscious of annoyance, but by no effort could he be got to make any further response. It was reported, however, that during the night which succeeded he spoke repeatedly. He died in the morning. Here the basilar artery near the junction of the vertebrae was the seat of a small aneurism about the size of a horse-bean; its bursting had given exit to a large quantity of blood; black coagulum occupied the arachnoid and subarachnoid cavities at the base of the brain, as well as the fourth ventricle. The medulla was also embedded in clot, and it surrounded the chord inside the dura mater as far as the cauda equina. (See Post-mortem and Case-book, No. 268.)

Diseases of Lungs. Pneumonia.—Speaking first of pneumonia under the title of diseases of the lungs, it will be observed that out of 131 cases complications were discovered in seventy; in other words, inflammation was manifestly a secondary condition in that number of instances. It appears further that the total number of deaths was fifteen, and that three only of these deaths arose from simple pneumonia. On referring to the particulars of these three fatal cases, it will be seen that one was a child (924) of five, brought to the hospital in a dying state, and suspected to have had hooping-cough; and that in a second (1644) the lungs were congested merely, extensive bronchitis coexisting as well as dilatation of the right ventricle of the heart. The remaining case was in fact the only one out of the fifteen which can rightly be called idiopathic, and in this the pleura took part in the inflammation. The patient was a messenger, aged forty-five (443), of sober habits. He had been complaining of debility and lassitude for two months. The acute attack he ascribed to having got wet four days before admission. Besides the general symptoms, the physical signs of pneumonia were well marked; but the latter were limited at first to the upper portion of the right lung. On the second day fierce delirium came on, and lasted persistently till the patient's death, two days later. On the post-mortem examination recent lymph was found coating the pleura. The whole of the right lung was consolidated, the upper lobe being in an advanced stage of gray hepatisation, exuding pus abundantly. The lower lobe was in the red stage, approaching gray in parts. A few small hepatised spots were found in the left lung, which was otherwise healthy, as were all the other organs.

A remarkable case, happily not fatal, displaying similar phenomena, viz. inflammation confined to the upper lobe, accompanied by violent delirium and low typhoid sinking, may be briefly mentioned in this connection. From the previous history and from the sequel it would appear to have been a case of simple pneumonia. The patient (154) was a nursemaid, aged twenty-eight. The attack had been sudden, and, at the time of her admission, had lasted for six days. The symptoms as described by the friends were not unlike those which usually accompany inflammation of the lungs, but there was nothing in the aspect of the patient (unless labial herpes be so considered) to indi-

cate the locality of her disease. There was found, however, on percussion very marked dulness below the right clavicle, along with hollow breathing and altered (much intensified) voice-sound. On the evening following her admission this girl (in whom, it should have been stated, the relatives had already noticed since the first seizure some strangeness of manner) sprang out of bed and ran naked through the ward. From that time, for four days she continued in a state of restless delirium, making grimaces and talking wild nonsense. At the end of the fourth day the tongue began to get dry, and sordes appeared about the mouth. At this period the pulse, which had been hitherto 112 or thereabouts, had sunk to 70, and its rate did not afterwards rise above 80. On the subsidence of active delirium the woman fell into a bewildered, puzzled state, from which she very gradually returned to her natural manner. Meanwhile the disappearance of the morbid sounds at the lung's apex, and their replacement by perfectly healthy breathing, took place gradually, in remarkable harmony with the general progress towards health. The patient left after four weeks' residence, tranquil and in her right mind, with nothing in the chest-sounds to indicate tubercular deposit. [It may be of interest to some to add, that though this woman was for the first day treated with antimonials, such treatment was abandoned on the appearance of delirium, and the signs of sinking which accompanied it; general stimulation with wine and ammonia being substituted.]

On reference to the Index, I find that in ten years 478 cases of pneumonia are enumerated, of which 292 were regarded as complicated, and 186 as uncomplicated. Of the whole number, it appears that 190 died, 25 only of such deaths being cases of simple pneumonia, or 5·2 per cent of the whole number.*

A statement bearing upon this subject has been placed in my hands by my friend Dr. Cheadle. It is derived from an examination of the post-mortem books of our Hospital from 1856 to 1865. In 149 cases of fatal pneumonia there recorded, 15 were uncomplicated cases. In 5 of these 15 both lungs were attacked, and in 6 the inflammation was chiefly of the apices. Dr. Cheadle states also that there were 19 cases out of the 149 in which one or both of the upper lobes were affected solely or primarily with very limited extension. Of these, 6 were simple idiopathic pneumonia, 4 were complicated with pleurisy only, and the remaining 9 with various severe diseases.

A case (414) with symptoms of gangrene of the lung was admitted, and discharged after eighteen days' residence, much improved.

A lad of 19 was twice in the hospital for pneumothorax (603 and 886). The condition could not be connected with phthisis. The history given was of sudden dyspnoea and syncope occurring to him while at work, with no premonitory symptoms whatever.

* Since writing this Report I have had occasion to refer to most of these cases in the Post-mortem and Case Books. It appears from thence that 25 far exceeds the number of fatal cases occurring in ten years from simple pneumonia. I hope shortly to publish some particulars as to the mortality of pneumonia derived from these records.

A man of 35 (772) was admitted for paroxysms of dyspnoea, for which no material cause could be discovered.

Bronchitis includes 131 cases, mostly of chronic disease. No death occurred from acute uncomplicated bronchitis.

Diseases of Mouth and Pharynx.—Diphtheria occurred once, and ended in death (1418). The body was not examined.

Diseases of Stomach, &c.—It will be observed that as many as eighty-four cases are ascribed to dyspepsia. The number is large, because, besides those instances of indigestion which are not traceable to organic change, I have found this a convenient place for some others which, while they depend on known structural lesion, have had dyspepsia for their chief symptom. Thus it will appear, on referring to the Index, that most of the cases in this list are so-called complicated cases. Chronic vomiting occurring as an indication of diseased kidneys is illustrated in two instances (388 and 827). In the first the disease was of more than ten months' standing, and amongst its earlier symptoms had been dropsy, which had disappeared under treatment in the hospital the previous year. The girl was admitted on the second occasion for dimness of vision. There was now no trace of œdema, but the urine was still highly albuminous. It was during this residence, and when in the enjoyment, as it appeared, of tolerable health, that vomiting occurred. It continued without abatement for twenty-three days, when the girl died exhausted. The kidneys in this case were small and granular.

The other patient was a healthy-looking girl of twenty-one, who stated that five weeks before her admission she had noticed swelling about the body and legs, and that this had been followed two weeks later by vomiting of food. Meanwhile there was some increase in the amount of urine passed. She had had a severe attack of scarlatina at 17, not followed by dropsy. The health since had been good. The girl's general appearance was healthy. There was some, perhaps natural, fulness about the face, but nowhere was there a trace of dropsy. So far, indeed, as the patient's look and general condition went, the case might have stood for one of hysterical dyspepsia. The urine, however, was high-coloured and very albuminous. During a fortnight vomiting continued daily. It gave some sign of abatement, indeed, at the end of the first week, but returned on the following day along with diarrhoea. She did not waste nor alter much in appearance. At the end of a fortnight, after many drugs had been tried without avail, but when nevertheless death was not thought to be near, she had three distinct epileptiform fits. After this she very tranquilly and speedily died. The kidneys were here of the large smooth kind, with increased cortex.

Three cases of obstinate vomiting occurred in connection with hysteria.

Ulceration of Stomach.—Ulceration of the stomach was fatal in four cases, viz. in two by perforation, in one by gradual exhaustion, and in one mainly from loss of blood. Three of these were women of or under thirty years of age. One has been already alluded to (1408)

as the subject of malignant disease. The other two were admitted with peritonitis, the result of perforation. The first (246) was a widow aged twenty-seven. For a long period she had been subject to occasional paroxysmal pains in the abdomen, but had had no symptom directly referrible to the stomach. A few hours before admission she was making unusual exertion in lifting a weight, when violent pain seized her in the left hypochondrium. She was brought to the hospital much collapsed, with all the symptoms of peritonitis, and died in three days. Perforating ulcers were discovered in the stomach after death.

In the next case (391), a girl of twenty-one, the acute symptoms were likewise sudden in their onset, dyspnoea being the most marked. The patient was of phthisical family, and subject to winter cough. She had been attacked with pain in the left chest four days before she came under treatment. From this history, and from the existence of creaking sounds, as of pleuritic friction, the condition was supposed to depend mainly on acute pleurisy. The abdomen was tense, indeed, but not tender; latterly it became tumid and tympanitic, and pain was referred to the region about the umbilicus; the day before her death (she was in the hospital just a week) the existence of peritonitis was obvious. Here it appeared that a perforating ulcer existed near the cardiac end of the stomach, which had been temporarily closed by recent adhesions. The original rupture, however, which was thus in process of repair, had given rise to circumscribed peritonitis, of which the woman died.

As some justification of the first diagnosis, it should be added that recent adhesions existed on the left side, and that the left lung was much compressed by the pushing-up of the diaphragm. It might perhaps be even suggested that pleurisy, with its accompaniments of laboured breathing and violent cough, had been the initial disorder, and had sufficed to break down old adhesions which protected a chronic ulcer. (See Post-mortem and Case-book, No. 90.)

The fourth patient was a man of 42 (685), who, while walking the streets in his usual health, was suddenly seized with vomiting of blood. This occurred two weeks before he sought relief at the hospital; during that time he had several similar attacks, and wasted considerably. The bowels ceased to act the day after the first hæmorrhage, since which they had not once been moved up to the time of admission. The patient was then much blanched, and had a remarkably soft feeble pulse, which kept to a rate of 116. The motions obtained by enema were pitch-coloured. Hæmorrhage returned the day after admission, and the stomach became intolerant of any kind of food. The man rapidly sank, and died nine days from the time of his admission.

On examination of the mucous membrane of the stomach, three spots of ulceration were found, each about the size of a shilling, situated on the posterior surface, about an inch from the lower curvature. On injecting water into the gastric artery, it spouted out in jets from the margins of two of the ulcers. There were vomicae in both lungs.

Diseases of Intestines.—I must mention, under the name of enteritis,

a case, numbered 994 in the register, where the symptoms and the post-mortem appearances so closely resembled irritant poisoning that the intestines were by order of the State submitted to chemical analysis. This was a girl of fourteen, who was brought into the hospital extremely emaciated and dirty, with all the signs of poverty and neglect, and died the day after admission. The mother's account of her (which was subsequently verified) was that she had been ill for eleven weeks, refusing food, and suffering constant vomiting and diarrhoea. When admitted she had a dry skin, furred tongue with irritated red papillæ; the conjunctivæ were bloodshot, the pupils natural, pulse 72. She answered questions readily and to the purpose, and had no pain or tenderness on pressure. The vomiting and purging ceased shortly before death, which occurred by rapid sinking. The description of the mucous membrane of the bowels is as follows: "About the cardiac end of the stomach were prominent folds of black charred appearance, under which was diffuse congestion. The discoloration occupied the whole thickness of the mucous membrane. The first two yards of the small intestines were natural, save for permanent black deposit, which became more abundant about the middle of the small gut, forming here patches on a greenish ground, as disposed to slough. There were a few hardened tubercles in the peritoneum. No trace of poison was discovered on analysis."

Ulceration of Intestines.—Of five fatal cases of ulceration of the intestine, there are two which are of interest from the obscurity of the diagnosis, and, I suppose, also of the pathology of the disease.

In the first case (539), a girl of nineteen had experienced cough, back-ache, and debility for nine months. She had also had hæmorrhage by the mouth, the nature of which was not ascertained. Seven months before her admission she had had what was called fever, and this attack, it would appear, was never perfectly recovered from. It was not stated that there had been any persistent looseness of the bowels. The girl came to the hospital in a very feeble state, with a frequent pulse and drying tongue. She died in a week. Pain in the hypogastrium, increased by pressure, with some tenseness about that region, together with some diarrhoea, were the prominent symptoms. Here, together with the evidence of recent peritonitis, viz. lymph and adhesions between the intestines, both new and old, a quantity of circumscribed pus was found near the spine, towards the right side, communicating with three small perforating ulcers in the ileum. These latter had no trace of tubercular or febrile disease in their appearance. The mesentery was much thickened, and riddled with abscesses. The kidneys, liver, and spleen gave the "amyloid" reaction.

In a case (503) similar to this in some respects, peritonitis from perforation was rapidly fatal to a man of sober habits, æt. 35. Three months and a half before he had been attacked with violent pains in the limbs, cough, and prostration, without diarrhoea, symptoms from which he had never rallied. Here the ulceration affected the patches of Peyer and bore a close resemblance to that which accompanies typhoid fever.

It was accordingly regarded as the sequel of that disease, though the commencing illness bore little resemblance to continued fever.

No. 648 is the case of a woman of twenty-four, who, a month before admission, when sitting down to dinner, had been seized with vomiting and faintness. The former continued, with short intervals, for two days, and was attended with considerable prostration and partial loss of consciousness. The symptoms then subsided, and she so far improved that for two weeks she was able to get about. At the end of that time the abdomen became enlarged and painful, and diarrhoea set in. When admitted, about ten days later, she had all the characteristic symptoms of peritonitis. She gradually sank, and died after thirteen days' suffering. In the post-mortem examination there was the usual evidence of recent general peritonitis. In the ascending colon, about three inches above the ileo-cæcal valve, and on the opposite side, was a spot of ulceration; the perforation which had here occurred led to a circumscribed abscess containing faecal matter. There was no trace of tubercle here or elsewhere.

Another case (150) of simple ulceration of the ascending colon was associated with "amyloid" degeneration of the kidneys. The patient (a tailor, aged forty-two) had for years been subject to attacks of illness arising from pain in the left hypochondrium, with the dyspeptic symptoms common in men of his trade. The attacks were not of long duration, and were apparently removed by purging. He came into the hospital for dropsy of three weeks' standing, the bowels having been loose for seven weeks.

In the single case (868), where perforation was due to ulceration of the vermiform appendix, the offending body was not the customary bean or cherry-stone, but a mass of faecal concretions. The perforation was at the extremity of the appendix, which was surrounded by soft lymph, so as to prevent the passage of faeces into the peritoneal cavity.

Diseases of Peritoneum.—Most of the cases of acute peritonitis are referred to in connection with the diseases or accident which gave rise to the inflammation. A young woman (383) died of acute peritonitis as the result of paracentesis for the relief of ovarian dropsy.

It will be found, on consulting the records of ten years, that in that time 198 cases of acute peritonitis occurred; 108 of these were regarded as complicated, and ninety were without discoverable complication. Of the whole number eighty-five died, namely, seventy-eight complicated and seven uncomplicated cases. The deaths ascribed to simple peritonitis all occur in the first five years of the period. They are probably cases which were not examined after death.

Diseases of Pancreas.—There is no entry of disease affecting the pancreas in the ten years of which we have a record.

Diseases of Spleen.—The spleen was much enlarged in two cases, both of which were fatal from disease elsewhere. In both the enlargement was very obvious during life. In one (662) there was a

history of ague having occurred many years before ; the other patient (1019) was a girl of eleven, admitted for ascites, dependent, as the event showed, on cirrhosis of the liver. Remarkable prominence of all the superficial veins and bleeding from the gums were marked features in this case ; otherwise it had the ordinary symptoms of hepatic ascites. Death took place very suddenly, owing to the accidental puncture of the epigastric artery in the operation of paracentesis.

Diseases of Liver.—Under the diseases of the liver some cases of inflammation and suppuration in that organ may be referred to. The first (238) was a waiter, aged fifty, of sober habits, who was first laid up owing to a fall on his left hip two months before admission. Recovering from the immediate effects of the accident, he failed to regain strength enough to resume his work. Together with debility obstinate constipation had existed for the last fortnight, so that no motion had passed for a week ; he had besides had slight jaundice and morning vomiting, symptoms which still remained. This man died rather unexpectedly by rapid typhoid sinking, a few days after admission ; vomiting, bronchorrhœa, and light jaundice, being the chief phenomena observed before death. Here all the viscera were found to be natural except the liver ; this was large, soft, and of a dirty green. On section it was discovered to be riddled like a sponge with small abscesses ; the intestines were natural throughout, nor could any suppuration be found elsewhere than in the liver ; the right shoulder and both knee-joints were opened with a view to finding secondary deposits.

The patient in case 493 was a stationer, aged thirty-three, of sober habits, and good health till nine days before admission. At that time he had a severe rigor, which left him weakened and unequal to work. Two days later he had acute abdominal pain, and then bilious vomiting, which was still present when he entered the hospital. By this time the pain, which had been at first general over the abdomen, had become fixed to the region of the liver. No defined attack of illness was known to have happened to him before this one, and he had never been abroad. The man, though thin, had a florid expression, there was considerable febrile excitement about him, and he was languid and stupid. On making pressure below the right false ribs some pain was experienced, and there was slight fulness in that region. A period of three days elapsed, during which pain became much mitigated under leeching, calomel, and opium. He then had a paroxysm of intense pain, referred to the dorsal spine, and soon after passed a dark, very filthy motion. After this he became very prostrate, and the bowels loose and irritable. Meanwhile the fulness in the hepatic region became more and more obvious, giving to the contour of the belly a decided leaning, so to speak, towards the right side. As his end drew near, a listlessness of manner came over him, and he ceased to have pain. Some hours before his death a trocar was introduced into the most prominent part of the right hypochondrium. About an

ounce of thick reddish fluid was thus withdrawn, which the microscope showed to consist mainly of pus-cells. The pulse rose soon after to 132; the man became very restless, and shortly died.

The following were the chief morbid appearances: there was recent peritonitis of limited extent. The liver was greatly enlarged, reaching to below the umbilicus; its right lobe was occupied by a large abscess, or rather, it had been converted into a mere cyst of pus: this pus was bloody, and had some soft coagula mingled with it; the puncture of the trocar had pierced the anterior surface of the liver and entered the abscess, but the contents of the latter were evidently too thick to escape by so small a hole. No trace of ulceration or other disease was discovered in the intestines, though these were carefully examined throughout. The remaining abdominal viscera were likewise natural.

A third illustration of primary hepatic abscess is No. 872, a coachsmith, aged forty-five. He had never been abroad, nor had dysentery, and his habits were sober and industrious. His illness (which had lasted two weeks) had been marked chiefly by lassitude and loss of appetite, pains in the head and loins, and occasional vomiting. There had been no irregularity of the bowels, but the urine had been very scanty. The patient had a bloodless pasty face, but no trace of jaundice or of cedema. He had an anxious troubled expression which was striking. Undue resistance of the parietes, dulness to percussion, and some tenderness were perceived in the right hypochondrium, and the edge of the liver (as was supposed) could be obscurely made out about two inches below the margin of the false ribs. The tongue had a reddish tip, the skin was cool, and the pulse not persistently frequent. This man remained a considerable time in the hospital, retaining all the while the same half-terrified look which he had at first. His leading symptoms were paroxysms of violent pain in the hypochondrium, and frequently-recurring rigors. These would be followed by profuse sweating and semi-unconsciousness, collapse being so extreme that he was often thought to be dying. There was nothing noteworthy in the evacuations, except that the bowels inclined to looseness. When the patient had been nearly a month under treatment, a puncture was made with a grooved needle in the hepatic region, where by this time slight bulging could be perceived. Nothing followed the withdrawal of the needle. The man sank at last, worn out by the anguish of the repeated paroxysms. The liver in this case was the seat of two very large abscesses, which occupied the back of the posterior lobe and had very thin walls; the posterior half of this lobe fluctuating very readily. About two pints of "laudable" pus escaped on section. The alimentary canal was examined throughout and found perfectly healthy, as were the other viscera.

In the two other cases (132 and 168) the abscesses appeared to have been of some standing, and in one of them (168) there was extensive ulceration of the large bowel. Both patients were soldiers who had been in India, and both had suffered dysentery. In 132 there was no

intestinal ulceration, but the kidneys were large and mottled, and they, as well as the spleen, gave the "amyloid" reaction with iodine.

Diseases of Kidneys.—Notice has already been taken of some fatal cases of kidney-disease. I would merely mention in this place eight cases in which these organs were affected by the so-called "amyloid degeneration." In some of these, other parts of the body were similarly affected. The youngest of the patients was twenty-three, and the oldest forty-eight. Two of these had suppuration of the bones of the skull; one had old-standing ulceration of the palate, one simple ulceration of the colon, and one ulceration of the glans penis. Three had advanced phthisis.

No case of Addison's disease occurred in the year.

Four cases of ovarian dropsy were tapped, and one was transferred to the surgeons for operation. A young woman of twenty died from the supervention of peritonitis (383) after tapping.

Diseases of Uterus, &c.—Diseases of the uterus and ovaries were mostly admitted into the ward specially appropriated for the diseases of women. The notes of such cases were taken by Mr. Thomas Leigh, obstetric assistant.

Diseases of Bones, Skin, &c.—Diseases involving bones and joints have been spoken of under other headings. In the division "skin and cellular tissue" a case (797) of elephantiasis of the hand has been placed. The patient was a well-conditioned man of 68, who had been a butler. He had first noticed seven months before he was sent to the hospital an enlargement of the middle finger, and soon after the back of the hand became swollen and painful. The whole hand then began to enlarge. No disease can be fixed on him except perhaps chronic rheumatism, occasional pains at least in the shoulders and knees. When admitted, and afterwards (for the general appearance underwent little change), the left hand was greatly enlarged and misshapen, resembling, but for its colour which was natural, a huge stuffed glove; slight pits could be made on it by pressure, and it was still somewhat tender at the back. Owing to the surrounding swelling, the fingers could not be sufficiently flexed to grasp objects; the hand was also irksome from its weight, so that the man generally kept it supported by a sling. He was in the hospital a considerable time, and various attempts were made by means of local applications to reduce the swelling. When treatment had been continued more than a month, ulceration commenced. The patient gradually weakened, and at length died—the fingers having ulcerated considerably first. There was no post-mortem examination, but a wax-model of the hand was made as it appeared on the commencement of the ulceration. This is to be seen in the Hospital Museum.

The other case mentioned as fatal (1553) has been alluded to already.

No entry occurs under diseases of the muscles.

Amongst anomalous and accidental cases I have included all those that could find no appropriate place in any of the preceding headings,

as well as some in which no diagnosis was formed, and some which, from their short stay in the hospital, were overlooked. A few medical cases moreover were treated in the surgical wards. The title of this and of former Reports excuses me for having neglected them. From all these causes, as many as thirty-four cases are enumerated in this place comprehending drunkenness, over-work, over-eating, suicide, &c.

In conclusion, I have only to allude to a case of hydrophobia admitted in my absence, the particulars of which have been kindly furnished by Mr. Jones, the resident apothecary, whose account is appended to this report.*

Feb. 9, 1866.

* Though responsible for this Report, I must not conclude it without stating that during the latter half of the year Dr. Reginald Thompson, the present Medical Registrar, was, by permission of the Medical Committee, associated with me in the labour of registration.

TABLE I.

*Table of Cases admitted into the Medical Wards of St. George's Hospital during the Year ending
December 31st, 1865.*

Nature of Disease.	Total Number admitted.	Total Number of Deaths.	Percentage of Deaths.	Complicated with other diseases.	Deaths among complicated cases.	Observations.
1. Fevers :						
Typhoid	19	3	15·8			
Typhus	59	9	15·2	8	2	
Slight (febricula)	27	.	.	2		
Remittent	.	.	.			
Choleraic diarrhoea	7					
Influenza	.					
2. Eruptive fevers :						
Measles	7	.	.	2		
Scarlatina	41	4	9·8	3	1	
Small-pox	3	.	.	.	.	Were all removed to Small-pox Hospital.
Erysipelas	23	1	4·4	3	1	
3. Intermittent :						
Quotidian	1					
Tertian	1					
Quartan	.					
Irregular	2					

Nature of Disease.	Total Number admitted.	Total Number of Deaths.	Percentage of Deaths.	Complicated with other diseases.	Deaths among complicated cases.	Observations.
4. Rheumatism						
Acute	49	3	6.1	15	3	13 are heart-complica- tions.
Sub-acute	111	1	.9	12	1	10 are heart-complica- tions.
Chronic	172	3	1.7	30	3	2 of these deaths arose from fever commu- nicated in the hospi- tal.
5. Gout and rheumatic gout	42	.	.	7		
6. Poisoning :						
Irritant	8					
Narcotic	5					
Syphilitic and gonorrhoeal	28	1	3.6	21	1	
Mercurial salivation	3	.	.	2		
" tremors (from mercury)	1	.	.	4		
7. Colica pictorum	17	.	.			
8. Intestinal worms	1					
Echinococcus						
9. Dropsies :						
Anasarca	124	33	26.6	118	33	
Ascites	27	10	37	24	10	
Hydrothorax	16	2	12.5	6	2	
10. Hemorrhages :						
Epistaxis	2	3	60	4	3	The 3 uncomplicated cases refer to as many admissions of the same patient.
Hæmoptysis	5	1	14.3	6	1	
Hæmatemesis	7	.	.	3	.	
Hæmaturia	6	.	.		.	

[illegible]

Nature of Disease.	Total Number admitted.	Total Number of Deaths.	Percentage of Deaths.	Complicated with other diseases.	Deaths among complicated cases.	Observations.
21. Tetanus	1	1	100			
Hydrophobia						
22. Diseases of brain and cord :						
Encephalitis	4	3	75	4	3	
Chronic disease of brain	3	6	33.3	9	6	
Epilepsy	18	5	62.5	5	3	
Apoplexy	8					
Functional disturbance	12					
Sunstroke				3		
Insanity	6	.	.			
Inflammation of cord.	1	1	100	1	1	
Disease of dura mater	1	1	100			
23. Paralysis :						
Hemiplegia	28	3	10.7	8	3	
Paraplegia	12	2	1.6	3	2	
General paralysis	2					
Local paralysis	12	1	8.3	3	1	
Wasting palsy	1					
24. Neuralgia :						
Of face and head	5					
Sciatica	15					
Angina pectoris	1	1	100			
Neuralgia of other parts	5	.	.	1		
25. Diseases of heart :						
Pericarditis	14	3	21.4	14	3	
Endocarditis	6	2	33.3	6	2	
Hypertrophy	26	10	38.5	22	10	

Dilatation	8	2	25	7	2
Fatty degeneration	(?)1	12	23	45	12
Valvular disease	52				
26. Diseases of blood-vessels:					
Aneurism	9	6	66.6	3	3
Phlebitis	4	1	25	2	1
Various peculiar conditions of thoracic aorta	5	4			
27. Diseases of respiratory organs:					
Laryngitis	1	1	100	1	1
Tracheitis	1	1	100	1	1
Bronchitis	131	18	13.7	70	16
Pneumonia	41	15	37	21	12
Gangrene	1				
Vesicular emphysema	13	4	30.7	13	4
Pleurisy	24	3	12.5	10	3
Empyema	2				
Pneumothorax	3	1	33.3	3	1
Asthma	1				
Hooping-cough	1	1	100	1	1
28. Diseases of mouth and pharynx:					
Glossitis					
Quinsey	9				
Cynanche pharyngea	12	.	.	3	
Relaxation of throat	2	.			
Diphtheria	1	1	100		
Mumps					
Goitre	1				
Enlarged tonsils	2	.	.	1	1
Suppuration of cervical glands	2	2	100	1	1
Ulceration	3	.	.	3	

Nature of Disease.	Total Number admitted.	Total Number of Deaths.	Percentage of Deaths.	Complicated with other diseases.	Deaths among complicated cases.	Observations.
29. Diseases of stomach and œsophagus:						
Dyspepsia	84	5	5.9	33	5	
Ulceration	6	4	66.6	4	4	
Stricture	3	.	.	3		
30. Diseases of intestinal canal:						
Enteritis	2	1	50			
Constipation	12	.	.	6		
Obstruction	3	3	100	3	3	
Diarrhœa	11	.	.	3		
Dysentery	1	1	100	1	1	
Ulcerations	9	6	33.3	9	6	
Simple colic	1					
31. Diseases of peritoneum:						
Acute peritonitis	17	10	59	12	10	
Chronic peritonitis	9					
32. Diseases of liver and gall-bladder:						
Congestion	2	.	.	2		
Cirrhosis	14	7	50	12	7	
Enlargement	12	2	16.6	11	2	
Abscess	4	4	100	2	2	
Gall-stones	2	.	.	1		
Jaundice	21	3	14.3	12	3	
Other diseases of liver (mostly malignant)	7	4	.	6	4	
33. Diseases of pancreas						
34. Diseases of spleen	2	2	100	2	2	

35. Diseases of urinary organs:						
Albuminuria	131	39	.	.	111	36.
Abscess of kidney and pyelitis . .	4	1	25	.	3	1
Malignant diseases of kidneys . .						
Renal calculus						
Supra-renal capsular disease	2	.	.	.	2	
Cystitis						
Ischuria						
Diuresis	4	1	25	.	1	1
Diabetes	17	4	.	.	4	3
36. Diseases of uterus:						
Amenorrhœa	12	.	.	.	9	
Leucorrhœa	5	.	.	.	2	
Menorrhagia	6	.	.	.	1	
Displacement	3	.	.	.		
Inflammation of uterus or ap- pendages	5					
Tumours (non-malignant)	6					
Polypus						
Cancer	7					
Vesico-vaginal fistula						
Diseases of external organs . . .	2					
Diseases of bones and joints . . .	14	3	21.4		9	2
39. Diseases of skin, &c.:						
Erythema	6					
Urticaria and roseola	3					
Lichen and prurigo	2					
Scaly eruptions	8	.	.	.	1	
Vesicular eruptions	5	.	.	.	1	
Pustular eruptions	3	.	.	.	1	
40. Diseases of skin, &c.:						

Nature of Disease.	Total Number admitted.	Total Number of Deaths.	Percentage of Deaths.	Complicated with other diseases.	Deaths among complicated cases.	Observations.
40. Diseases of skin, &c.— <i>continued.</i>						
Pompholyx and rupia . . .	3	1	33·3	2	1	
Cellular inflammation . . .						
Superficial abscess . . .	1	1				
Elephantiasis . . .	3	2	66·6	1	1	
Diseases of absorbent glands . . .						
Diseases of muscles . . .						
41. Diseases of muscles . . .						
42. Anomalous and accidental cases . . .	34	3				

TABLE II.
Table showing the Percentages of Mortality of certain Diseases during a Period of Ten Years.

	No. admitted.	Percentage of Deaths.
Continued Fever	1237	11·6
Scarlatina	172	10·4
Erysipelas	225	14·2
Chorea	220	1·8
Delirium tremens	154	20·8
Tetanus	5	60
Hydrophobia	1	100

OCTAVIUS STURGES,
Medical Registrar in 1865.

*Case of Hydrophobia reported by T. Jones, Esq., Resident Medical Officer.**

Elizabeth O., admitted December 11th, 1865, under Dr. Barclay. She is eleven years of age, and said to have enjoyed good health until Saturday the 9th inst., when she complained of feeling "sick." This was considered to be simply a bilious attack, and for which pills, obtained from a chemist, were administered. During the evening the bowels acted twice from the pills. On the following morning, the 10th, she complained much of pain and oppression about the præcordial region, which was considerably increased at the sight of fluids. She was very thirsty, and desired some tea; but she could not drink it until after several attempts were made. About noon her mother began to wash her; the effects, however, of pouring the water into the bath frightened her so much that her mother was obliged to desist, as she feared a "fit" would come on. During this day (the 10th) she did not drink, after she drank the tea, or eat any thing, although she was very anxious to do so. She walked to the chemist in the afternoon and had a powder; and in the evening she played with children, and was even able to sing. During the night she slept well. On the morning of admission (the 11th), in walking somewhat quickly to catch the omnibus, her mother noticed "she began to froth at her mouth," and was unable to swallow her saliva. She walked a part of the way to the hospital.

State on admission.—[She was brought to the hospital with the view of being made an out-patient. I was on that day seeing the out-patients; and although several patients were in the room at the time, I was particularly struck with the appearance of this girl—one which cannot be easily overlooked or forgotten when once seen.] Her expression of countenance was remarkably anxious and wild. She was very restless, and cried when spoken to. The skin was cool. She complained of pain and uneasiness across the chest and in the throat. The respirations were very irregular, sometimes quick and superficial, and sometimes slow and deep-sighing. The lungs, on auscultation, were found perfectly healthy. The pulse was peculiar; it was small, and sometimes so frequent that it could not be counted, and suddenly it would become slower. The heart was found healthy. Looking upon the case as one of hydrophobia, I at once insisted that the mother should allow her to be sent to bed.

She was seen by Dr. Barclay as soon as she got to bed, about one P.M., and was ordered two grains of calomel and half a grain of opium at night, and black draught in the morning. Whilst in bed she was very restless, tossing herself from one side to the other. The pain in the chest and constriction in throat were much increased when attempts

* For the post-mortem appearances in this case see Post-mortem and Case Book, No. 345.

were made to swallow liquids; she could scarcely take any thing. After some difficulty she swallowed the pill about eight o'clock. She was particularly clear in her mind; was in fact very precautions; expressed her opinion very strongly against her mother's conduct in leaving her in the hospital. She seemed to be quite aware that she should not recover, and sympathised with her father in the prospect of losing her, as "she was his only daughter." These were the chief topics upon which she spoke whilst in the hospital. About 9.30 P.M. she was seized, in my presence, with what appeared to be a spasm of the muscles of the throat and larynx; it was with the greatest difficulty that she was kept in bed. Notwithstanding the use of stimulants, and cold applied to the face, she did not rally. She died partly by asthenia and partly by asphyxia.

I afterwards ascertained from her mother that she was bitten in the back of the leg about Christmas 1863. The wound was very ragged, two inches by one; it was washed and poulticed, and it rapidly healed. The scar was still well marked, especially during the cold weather, when it assumed a blue colour. There was no difference in the scar during the present illness. There was no evidence to prove that the dog was rabid. He died a few weeks ago. There is some reason to believe that the girl was bitten by some other dogs, which were killed.

ANNUAL REPORT OF THE SURGICAL CASES TREATED IN THE HOSPITAL DURING THE YEAR 1865.

DURING the year 1865, 2107 cases were admitted into the surgical wards of St. George's Hospital. Of these, 2062 were admitted directly under the surgeon, and 45 having been entered in the first place under the physician for some medical disease, were subsequently transferred to the surgeon for some secondary complication.

In the following abstract, these cases have been divided into two primary sections, viz. (1st) injuries, and (2d) diseases. But it will be seen that this division, though convenient, is not perfect, since cases belonging to one section must necessarily sometimes be transferred to the other, as, for instance, a scalp-wound complicated with erysipelas. In the first division, or injuries, various subdivisions have been made according to the part of the body injured. Thus we have a subdivision including injuries of the head, another of the face, a third of the back, and so on. In this section also a subdivision is allotted to general injuries, such as burns and scalds. In the 2d division are considered (1st) general diseases, including the so-called hospital diseases, and (2d) the diseases of organs concerned in any special function, as that of circulation, of respiration, &c.

GENERAL INJURIES.—In this class twenty-eight *burns* and thirty *scalds* were admitted. These principally occurred in children, and arose either from their clothes catching fire or from their upsetting kettles of boiling water over themselves. One little child, aged two and a half years, was both burnt and scalded. This arose from her falling into the fire, and in so doing, upsetting a kettle of boiling water over herself.

The treatment adopted was almost the same in every case: ordinary calamine cerate was applied, and the part then swathed in cotton-wool. The first dressing was removed in about forty-eight hours; and if there were deep sloughs, a digestive ointment was applied. Opium was given to allay pain, and a generous diet allowed from the first.

Some of the cases were complicated with other injuries, as in two admitted from the explosion of the gasometer at Nine Elms, where the patients both suffered from very severe scalp-wounds. Another case was complicated with fracture of the thigh. One little child had

œdema of the glottis, for which tracheotomy was performed, the case terminating fatally.

The total number of deaths was eighteen, and of these only one was subjected to a post-mortem examination. This was the case of a woman who had fallen into the fire ten days previously, while in an epileptic fit, and who was admitted with a most extensive and deep burn down the right side, and in a very low condition. She sank, and died six days after admission. After death the brain was found to be congested, and the bronchial tubes full of pus and intensely injected. The bowel was examined carefully, and found to be perfectly natural.

INJURIES OF THE HEAD.—In this class one hundred and fifty-one cases were admitted. These comprised forty-five cases of *scalp-wound* not exposing the bone, which were for the most part admitted because they were complicated with some other injury, the ordinary practice of this hospital being to treat simple scalp-wounds as out-patients, unless they chance to be of a very extensive nature. Two cases were attacked with erysipelas; both recovered. One case terminated fatally: it was that of a man who was admitted, having fallen off a cart, with three most extensive scalp-wounds running across the skull from the forehead to the occiput. Death occurred on the twenty-first day. The cause of death was somewhat obscure; it was set down to pyæmia, but during life the patient presented none of the symptoms of that disease beyond profuse sweating, and had no rigor; and after death the appearances were by no means conclusive. The veins of the diploë were natural. There were no abscesses in any of the viscera, though there was serous fluid in the bronchial tubes, and a large abscess in the thigh. This latter, however, may have been from extravasated blood from the injury, which had suppurated.

Thirty-two cases of *scalp-wound* were admitted where the bone was exposed and more or less bruised. Four of these cases terminated fatally—one from most extensive diffuse cellular inflammation in a butcher who had been accustomed to drink largely; one from pyæmia on the twenty-fourth day, in which, after death, the diploë was found infiltrated with pus and secondary abscesses in the lungs and liver; and two cases from meningitis, which in one was of a very chronic nature, and did not come on for forty-five days after the receipt of the injury. After death, the bone in the neighbourhood of the wound was found to be much roughened and thickened. Pus was found between the bone and dura mater, in the arachnoid and sub-arachnoid spaces, and in the brain-substance itself.

Forty cases of *concussion* were admitted. These were for the most part of a slight nature, the prominent symptoms having passed off before admission, and the patient being simply found to be drowsy and disinclined to be roused. The only treatment consisted in keeping them quiet in bed for a few days, with perhaps an occasional dose of calomel.

Eight cases of *simple fracture of the skull* were admitted. Two of these were brought in dead, and one died almost immediately after admission.

Of the five remaining cases, two recovered. These were both boys, the one aged ten, the other eleven; and their cases were almost similar. In both the accident occurred from falling some distance to the ground. The prominent symptom in both was partial insensibility on admission, with a severe bruise on the head, followed by a succession of extremely severe fits. The insensibility lasted in one case eleven days, in the other twelve. After the bruising of the scalp had subsided, in one boy a fissure, with separation of the contiguous edges, could be felt running from the right mastoid process to the sagittal suture, through the parietal eminence; in the other a small triangular depressed spot could be felt on the top of the head.

Of the three remaining cases which terminated fatally, one died of erysipelas. In another there was laceration of the cerebellum, and the fracture ran through the lateral sinus, which was ruptured. The third was a case of some interest; it was that of a man who had fallen a distance of twelve feet, pitching on his head. When admitted, he presented the ordinary symptoms of compression of the brain, though in no marked degree; and a small ridge of bone could be felt depressed under the temporal muscle. The crown of the trephine was applied, and the depressed bone elevated. Several loose portions were removed; one of these contained the groove for the middle meningeal artery, which was lacerated. The patient died on the second day. After death, the dura mater was found to have been torn by the bone in two places, and there was considerable superficial bruising of the brain.

Ten cases of *compound fracture of the skull* were admitted. One of these was brought in dead, and one died an hour after admission. Five recovered. In four of these there was only slight fissure of the skull, and they had not a single bad symptom; in the other there was extensive fracture running from the parietal eminence to the mastoid process. This patient remained in the house for a long time after the wound was healed, with no very well-defined symptoms, beyond intense pain of the head; and ten months later he was re-admitted with a recurrence of the pain and some loss of power in the opposite side. Under the influence, however, of a slight course of mercury, he recovered. The three remaining cases died. Two of these call for no special note; they both died of inflammation of the membranes. The third, however, is one of special interest, since he was entirely relieved of his symptoms by trephining; for it was a depressed fracture, and if it had not been for the accidental supervention of pyæmia, there is every probability he might have recovered.

An excavator, aged thirty-four, was admitted suffering from compression of the brain, a load of "compo" having fallen a distance of forty feet on to his head. When admitted he was quite insensible, with stertorous breathing; the pupils dilated; convergent strabismus of both eyes, and slow, laboured pulse. There was a ragged scalp-wound on the centre of the forehead, leading down to a fracture of the frontal bone, which was comminuted, and the fragments depressed. Directly after the operation his breathing became more natural, and

the stertor disappeared ; and the following day he was quite conscious, without strabismus. His pulse was 132. He was bled to 3xij. He went on at first remarkably well ; the pulse sank, and he enjoyed his food and slept well, the only symptom being slight paralysis of the right side of face. On the twelfth day he was seized with a severe rigor, symptoms of pyæmia now set in, and he sank, and died in a few days. After death the bone around the wound was found to be opaque and infiltrated with pus, and secondary abscesses were found in the lungs, and patches of intense congestion in the spleen.

Twelve cases of *fracture of the base* of the skull have occurred during the year ; these have all been in adults, and through the middle fossa of the skull. Four cases terminated in death, the remainder recovered.

The chief symptom that has guided us in our diagnosis is continuous and profuse bleeding from the ear. Unless this was present no case has been entered under this heading ; occasionally other symptoms have been noted to confirm our diagnosis, more especially paralysis of the portio dura et mollis.

One case presented considerable difficulty in coming to a correct conclusion as to its nature, and had it not been for a subsequent examination of the head after death it must ever have remained obscure. It was that of a lad of seventeen years of age, who had fallen backwards from a ladder a distance of fourteen feet. He was insensible when picked up, but recovered his consciousness in two or three minutes. When admitted he was quite sensible, and answered questions rationally ; there was slight oozing of blood from the left ear, which however ceased in the course of an hour. He continued free from symptoms for four days, when he began to complain of pain in his ear, and there was noticed to be slight purulent discharge from it. The pain and discharge continued for six days, when facial paralysis of the right side was noticed, and he complained of being deaf on the affected side. The pulse, however, did not rise, and he continued much in the same state for five days, when the pulse became accelerated ; the next day he was delirious, and speedily became comatose, and died on the nineteenth day after the accident. At the post-mortem examination the ventricles were found full of sero-purulent fluid. Pus was found in the arachnoid and subarachnoid cavities at the base ; and a fracture running from an inch above the petrous bone on the left side to the foramen lacerum medium across the temporal bone. The dura mater was uninjured, but the membrana tympani was ruptured.

Four cases of severe *bruising of the scalp*, which call for no special remark, conclude our list of cases of injury of the head.

INJURIES OF THE FACE.—This division contributed forty-eight cases. Of these by far the greater proportion were simple *contusions and bruises*, of which there were sixteen ; and *wounds*, of which there were twenty-three ; and these for the most part were the effects of intoxication, either from blows received in drunken rows, or from falls whilst under the influence of liquor. Four of these cases were com-

plicated with other injuries, the most severe being a fractured leg. Two cases were followed by slight cutaneous erysipelas, and one case was combined with epilepsy; in fact, the injury was the result of a fall whilst in an epileptic fit.

One case terminated fatally, and is of considerable interest, since the symptoms were very mixed in character, the diagnosis by no means certain, and the post-mortem lesions such as were not anticipated. The case was that of a cabman, who was treated at first as an out-patient for a wound across the bridge of the nose, of a superficial character, produced by falling off his box whilst in a state of intoxication. On the second day he presented symptoms resembling delirium tremens, and was admitted into the house. Morphia was administered, and under its influence he slept for some hours, and awoke much quieter and more rational. Nothing further occurred for four days, except that he was noticed to be queer in his manner and to answer questions vaguely, and that his tongue was furred. On the seventh day, however, after the accident, he was seized with vomiting, his pulse became exceedingly quick and his tongue dry, and the following day he became comatose and died. Upon post-mortem examination, the skull was found to be exceedingly vascular throughout, and the frontal bone, more especially over the right frontal eminence, was much bruised, and the diploë infiltrated with blood. Pus was found in the subarachnoid cavity, and a large quantity of turbid serum in the ventricles; the brain was exceedingly vascular throughout.

Two cases of *fracture of the bones of the face* were admitted; in one there was a compound fracture of the superior maxilla, produced by a kick from a horse.

One case of *dislocation of the lower jaw* was admitted. The dislocation had existed four months, and was on both sides; it was reduced by manipulation under chloroform, and the patient, up to the time of her discharge, had no return of the luxation.

Two cases of *wound of the eyelid* and four of the *eyeball* are also included in this class. In three of the latter the accident arose from a chip of iron flying into the eye from off the anvil in smiths; in the other, from a stone thrown by a boy. In three cases the cornea was perforated, the aqueous humour discharged, and the eye subsequently entirely destroyed. In the fourth the eye was not destroyed, but the cornea became opaque, and the iris adherent to it; the patient, however, could see a faint glimmer of light with it.

INJURIES OF THE BACK.—In this class there was no case of any especial interest. They comprise thirty-nine cases of *contusion* and bruising of the back: one case of *wound*, produced by falling backwards over a chair; one case which has been put down as *concussion*, but which was supposed to be a case of imposition, as the patient stated that he had loss of power in the lower extremities, and could not walk without limping. He was noticed, however, sometimes, when off his guard, to walk perfectly naturally. One case of *injury to the spinal cord*, producing paralysis of the lower extremities and

loss of sensation as high as the umbilicus, also occurred. No prominence or inequality of the spinous processes could be detected. The patient died on the third day from congestive pneumonia. Permission to open the body could not be obtained from the friends.

INJURIES OF THE NECK.—Among these are four cases of suicidal *cut-throat*—three males and one female. In all the line of incision was through the thyro-hyoid membrane. One case is interesting in a medico-legal point of view, inasmuch as the incision extended further on the right than on the left side of the neck. This patient was not left-handed. In one case, which terminated fatally on the second day, the patient had exposed, but not injured, the carotid artery. Another entirely lost the power of deglutition for fourteen days, and he was fed during that time by injections of beef-tea and brandy through a gum catheter passed into the stomach.

Three other cases of *wounds of the neck* were admitted. One was a very deep wound among the muscles at the back of the neck, produced by broken glass. Four cases of *contusions* to the neck, and two cases of *alleged foreign bodies* in the *pharynx*, were also admitted. One of the alleged foreign bodies was stated to be a halfpenny, in a little child; the other a pin, in a young woman.

INJURIES OF THE CHEST.—By far the greater number of cases classed under this heading were either *fractured ribs* or *simple contusions*. Of the former there were thirty-six instances; of the latter, twelve.

Eight of the cases of fractured ribs were complicated by other injuries; but for the most part the cases were of a slight nature, and, with the exception of three, were not followed by any of those dangers so liable to occur after an injury of this sort; at the most causing a slight attack of bronchitis, which, under the use of appropriate remedies, soon passed off. Of the three cases referred to, two were attacked with pneumonia, and one patient's life was in imminent danger for some days. He, however, made a good recovery. The third case was that of a little boy who was run over, and who was admitted in a state of extreme collapse, with the greater number of the ribs on the left side fractured. There was intense dyspnoea, so that he could not lie down for an instant. The left chest was full of fluid, with dulness throughout and an entire absence of respiration. With the exception of some slight febrile symptoms for some few days, he made an uninterruptedly good recovery; and when he was discharged, about a month after the accident, the whole of the blood had been absorbed. There was perfect resonance, and the respiratory murmur could be heard over the whole chest.

One case of fractured rib died from fatty disease of the heart—an old woman, aged sixty-two, who died suddenly as she was being got out of bed for the first time after the accident.

Five cases are entered as *wounds of the chest-wall*; but, in truth, these should rather be denominated contusions, since they were all only slight grazes of the skin, complicated with bruising, and produced by the direct violence of wheels passing over the body.

One case of *fractured sternum*, or more properly speaking, separation of the ensiform cartilage, occurred from slipping as the patient was getting on to the box of a carriage. One case also of fracture of the upper part of the sternum occurred, conjoined with fracture of both clavicles.

Three cases were admitted with supposed *rupture of the lung*. One only of these cases terminated fatally. In one of the favourable cases—a railway-porter who had been jammed between two railway-trucks—the symptoms were very severe. When admitted he was pulseless, with cold skin and blanched lips, loud moist râles over the whole of the affected side, and very considerable hæmoptysis. He rallied from this collapse, and on the second day was attacked with pneumonia, accompanied by most tumultuous action of the heart, which, however, was entirely relieved by venesection. He gradually recovered, and was discharged on the twentieth day with the lung apparently sound, though he was still in a very weak state.

The other favourable case occurred in a little boy, and it was a question whether it was the lung or the liver which was injured. The accident occurred through his endeavouring to cross the road in front of a carriage, which knocked him down, and the wheel passed over the lower part of the right chest. When admitted, the symptoms pointed more to lung-mischief. There was intense collapse, with blanched lips, difficulty of breathing, and inability to lie, except on the affected side. There was also blueness of the face. On the fourth day, however, he began to complain of pain in the abdomen, and it became tympanitic; but at the same time bronchial râles could be heard at the base of the right lung. He made a good recovery.

The case which terminated fatally only lived a few hours. Admitted in a state of extreme collapse, he never rallied. The accident occurred from a stone arch of a bridge in the course of construction falling and burying him in the débris. No permission to make a post-mortem examination could be obtained from the friends.

INJURIES OF THE ABDOMEN.—Among these are found included *contusions* of the abdominal wall, of which there were thirteen cases; *wounds* and *contusions of the scrotum*, seven cases; *ruptured viscera*, seven cases; and one case of *fractured pelvis*.

Contusions of the abdominal wall were slight, principally occurring in little children, from being run over. Six of the cases occurred in adults; and in three of these the symptoms were rather severe at first, there being considerable collapse. This, however, soon passed off, and they did well. In one, blood was noticed in the water once, and only once.

Of the *injuries to the scrotum* four were bruises, and three were wounds. The injury in five cases was caused by falling astride something, and in one case was complicated with bruising in the perineum, but no laceration of the urethra. In one case the injury resulted from the kick of a horse, and in the remaining case from being run over. In this patient there was a wound extending from the external ab-

dominal ring to the bottom of the scrotum, much the same as is made in the operation of castration. The testicle was fairly dissected out, and lay, attached by the cord, on the front of the thigh. It was replaced, and the wound brought together by silver sutures. It healed almost entirely by the first intention.

Of the *ruptured viscera* two cases were brought in dead. Of the remaining five, in two the kidney was supposed to be ruptured. They both recovered; or rather, perhaps, it would be more correct to say that one was discharged, having recovered; the other, in a fair way for recovery, discharged himself, against the advice of his surgeon. In one case the liver was ruptured. This patient, a boy aged fourteen, was run over. After the accident, he got up and ran across the road, when he fell down again. He died in two hours. On post-mortem examination, the right lobe of the liver was found to have been torn vertically through, and separated from the rest of the organ.

One case was a rupture of the duodenum, admitted the day after the accident—a kick from a horse—with acute peritonitis. He died on the evening of the following day. After death, a rupture two inches long was found in the anterior wall of the gut. The peritoneum was much injected, and the intestines glued together with soft lymph.

The remaining case was one of ruptured urethra, and occurred in the usual way in which these accidents take place. The patient was walking along the unfinished flooring of a building, when his foot slipped and he fell astride of a joist. When admitted he was collapsed. There was considerable swelling and ecchymosis in the perineum, and blood was issuing from the urethra. Luckily, after some little difficulty a No. 8 silver catheter was got into the bladder, and was kept there for a fortnight. After this a catheter was passed every day for another week, and he was then discharged, with strict injunctions to come up twice a week to have an instrument passed, as there was already some tendency to contraction of the calibre of the canal.

INJURIES OF THE UPPER EXTREMITY.—In this class seventy-eight cases were admitted. Of these twenty-seven were *wounds*; two wounds about shoulder-joint; four wounds of the arm; twelve wounds of the forearm, in two wounding the ulnar, in one the radial, and in one the posterior inter-osseous artery; and nine wounds of the hand, in one wounding the palmar arch. Four of these cases were admitted because they were complicated with injuries elsewhere; and seven were first treated as out-patients, and were admitted into the hospital on account of some secondary mischief; in four cases diffuse cellular inflammation, and in three hospital gangrene.

One case of wound of the forearm was of very old standing, the injury having been inflicted four years previously. It was in an hysterical girl aged nineteen, and the interesting feature in connection with the case was, that she had periodically a discharge of blood from it, lasting three or four days, at the catamenial period.

Two of the above-mentioned cases died: one with a wound completely transfixing the forearm died, on the thirtieth day, of pyæmia;

the other, with a wound about three inches long above the external condyle of the humerus, died on the tenth day of traumatic gangrene.

Eleven *fractures* of the upper extremity were admitted, consisting in four of the clavicle, two of the humerus, three of the forearm, and two of the bones of the hand. In one case both clavicles were fractured, and also the sternum. The patient was treated without any apparatus or bandage, by being laid simply on his back, and with very good results, the bones uniting without any displacement. One of the fractures of the hand presented as well a rather rare form of injury. The man had fallen off a carriage, and when admitted was found to be suffering from a fracture of the metacarpal bones, and also a dislocation of the bases of the second, third, and fourth, on to the dorsum of the carpus. Reduction was easily effected under chloroform. The man was subsequently attacked with diffuse cellular inflammation of the leg, from a slight graze on the shin, and died of pyæmia. At the post-mortem examination abscesses were found in the leg and left eyeball.

Fifteen cases of *compound fracture* were admitted. Of these five were of the fingers or hand, and were all admitted in order that the injured part might be removed.

A short account of the remaining ten cases will be found among injuries of the lower extremity, where all the cases of compound fracture are considered together.

Ten *dislocations*, five of the shoulder, two of the elbow, and three of the thumb, were also admitted. One of the cases of dislocation of the elbow, accompanied by Colle's fracture of the radius, was compound. It was followed by diffuse cellular inflammation, necessitating amputation; and death occurred from pyæmia.

In one case of dislocation of the thumb reduction was found to be impossible until the flexor tendons had been divided; the head of the bone then easily slipped back into its place.

Two cases of severe laceration of the hand were produced by the bursting of guns; both cases were attacked with hospital gangrene; and in one it was found necessary to remove a portion of the hand.

Five *contusions* and eight *sprains* complete our list of injuries to the upper extremities.

INJURIES OF THE LOWER EXTREMITY.—This class presents us with a much larger number of cases: the reason of this is obvious, injuries of this part being so much less favourable for treatment as out-patients.

The total number of the cases in this class is 418. Among these are fifty-seven cases of *bruises and contusions*; these were all slight, with the exception of one in which the extravasation arose from a rupture of the popliteal artery. This man was admitted, having been run over the day previously by a cart, the wheel passing over his leg. When admitted, there was found to be enormous swelling from effused blood all up the left leg and thigh almost to the groin. The limb was quite hard, and the skin tense, and as high as the knee icy cold; there was no pulsation in the tibials; above the knee the limb

was somewhat warmer, but very hard and tense; there was a large patch of ecchymosis on the inner side of the thigh, and a small wound just below the knee. When admitted, he was in such a collapsed condition that operative interference was out of the question; and the following day the thigh was somewhat softer and warmer. In the evening, however, he had a severe convulsion, after which he sank rapidly, and died the next morning. On examining the limb, a complete rupture of the popliteal artery was found just at the spot where it passes through the opening in the adductor magnus, the vein being ruptured at the same spot. The knee-joint was uninjured.*

Fifty-two cases of *wounds* were admitted; three of these were of a very extensive nature, and in two there was a suspicion that the knee-joint was opened, as there was considerable effusion in the synovial sac, and an appearance of fluid resembling synovia about the wound; they both, however, recovered without any serious joint-mischief. Three cases were attacked with phagedæna, two with erysipelas, and two had inflamed absorbents. One case was complicated with delirium tremens.

One hundred and thirty-nine cases of *fracture* of the lower extremity were admitted. These comprised twenty-nine cases of fracture of the shaft of the femur and ten of the neck. Sixty fractures of both bones of the leg, seven of the tibia alone, and thirteen of the fibula; fifteen fractures of the patella, and five of the bones of the foot.

One case of fractured thigh, complicated with a very extensive scald produced by the explosion of a boiler, died on the second day, and one case of fractured neck of thigh-bone died of exhaustion, consequent on extensive bed-sores. Three cases of fractured leg died, one of delirium tremens, one of fatty degeneration of the heart, and one of pyæmia consequent on a compound fracture of the arm. One case of fractured patella died of bronchitis, which followed an attack of scarlet fever.

The fractures of the patella were all transverse, with the exception of one which was stellate, produced by a fall on the knee; except in this case Malgaigne's clamps were used in every instance, and it is believed with very satisfactory results. The manner in which they are used in this hospital may, perhaps, be briefly mentioned. Before they are applied, a couple of turns of strapping is made to encircle the limb above and below the patella, and the claws of the clamp are fixed into this; thus doing away with the necessity of burying the hooks in the skin—a proceeding which often causes considerable pain and inconvenience, and which, as in one case which occurred here some years ago, may be followed by erysipelas.

The ordinary mode of treating fractures here is to put them up in the appropriate splints until all swelling has subsided, and then immediately to put them up in pasteboard splint, with a gum bandage; this is done in some cases in two or three days, in others not

* A detailed account of this case will be found at p. 247.

for as many weeks. The pasteboard splint is thought to answer the purpose required better than any other of the numerous appliances recommended; it is easily applied, and can be accurately moulded to the limb, and possesses the double qualification of being very firm and strong, at the same time that it is light and easily worn.

Twenty-six cases of *compound fracture* were admitted; of these four were of some bone of the foot, and were admitted on account of severe laceration of soft parts requiring amputation; and one was a compound fracture of the pelvis, produced by a fall from a scaffold thirty feet in height. The fracture was an extensively comminuted one of the right ileum, with a small punctured wound. Death resulted on the thirty-third day from pyæmia. The remaining compound fractures were of the extremities. These, with the fractures of the upper extremity previously referred to (page 371), will now be considered.

During the year, thirty-one cases of compound fracture of the long bones of the extremities were admitted; of these twelve proved fatal, or 38·7 per cent. Of these, two were of the thigh, one died; nineteen were of the leg, seven died; eight were of the arm, three died; two were of the forearm, one died.

Pyæmia was the cause of death in five instances; gangrene and sloughing in two instances; in two the patients never seemed to rally from the injury, and death was ascribed to shock; and in the remaining instance the case was complicated with fracture of the base of the skull, from the more immediate effects of which he died.

These cases are arranged in a tabular form, as follows:

Name and Age.	Nature of Accident.	Limb.	State of Fracture.	Treatment and Result.	Remarks.
George C., 21.	Caught his leg between a railway carriage and the platform.	Right leg.	Bone comminuted. Two long lacerated wounds.	Loose pieces of bone removed. Assellini's box. Secondary amputation. Died 25 days.	He had sloughing of the wound and ulceration into the anterior tibial artery, for which amputation was performed. He died of pyæmia. Post-mortem. Secondary abscesses in lungs.
James B., 20.	Run over by wagon.	Right leg.	Transverse fracture. Small punctured wound.	Assellini's box. Pad over wound. Died 8 days.	This man had other injuries. Extensive sloughing came on, and pyæmia, from which he died. No post-mortem.
George D., 23.	Run over by railway carriage.	Right forearm.	Bone comminuted. Extensive laceration of soft parts.	Primary amputation. Died 26 days.	Died of pyæmia. Post-mortem. Abscesses in shoulder-joint, in lungs and liver, and in cellular tissue of pubes.
George R., 44.	Kicked by horse.	Left leg.	Comminuted fracture. Small punctured wound. Great effusion of blood.	Assellini's box. Opium and stimulants. Recovered 161 days.	He was attacked with hospital gangrene, followed by considerable necrosis.
Richard W., 23.	Horse ran away with him, and he jumped off.	Left leg.	Bone comminuted. Small wound.	Assellini's box. Opium. Secondary amputation. Recovered 73 days.	He was attacked with osteomyelitis, for which amputation was performed.
William S., 37.	Run over by light cart.	Right leg.	Great displacement. Oblique fracture. Small wound.	Side-splints and afterwards box. Recovered 122 days.	Accident was followed by diffuse cellular inflammation and necrosis of a large piece of bone. This was removed.
Edwin T., 16.	Caught his arm in saw-mill.	Left forearm.	Ulna fractured in three places. Severe laceration of soft parts.	Primary amputation. Recovered 20 days.	

Hugh S., 45.	Fell out of window. Knocked down by train.	Left thigh. Right arm.	Oblique fracture. Wound an inch in length. Bone comminuted. Extensive laceration.	Long splint. Recovered 146 days. Primary amputation. Died 19 days.	The thigh-bone would not unite for a long time. This man had also scalp-wound and fractured leg. Died of sloughing.
Edward F., 32.	Caught his arm between the buffers of two railway trucks. Thrown off horse.	Left arm.	Compound dislocation and fracture of elbow - joint. Wound an inch long.	Primary excision. Secondary amputation. Died 10 days.	On the third day traumatic gangrene set in, and amputation was performed the following day.
George D., 17.		Left leg.	Transverse fracture. Small wound.	Assellini's box. Pad over wound. Recovered 23 days.	The wound healed under the pad.
Emile C., 24.	Fell from a hoisting-lift.	Right leg.	Transverse fracture. Small wound.	Assellini's box. Died 2 days.	He had also fracture of the base of the skull.
John W., 31.	Thrown off a horse.	Right arm.	Transverse through centre of humerus. Small wound.	Side - splints. Recovered 60 days.	
William R., 46.	Kicked by a horse.	Left leg.	Long lacerated wound. Bone comminuted. Leg much bruised.	Assellini's box. Secondary amputation. Died 27 days.	Died from pyæmia.
Henry B., 14.	Knocked down by horse.	Left arm.	Transverse fracture. Small wound.	Four side-splints. Recovered 30 days.	
Robert G., 37.	Knocked down by another man.	Right leg.	Oblique fracture. Small wound.	Assellini's box. Recovered 34 days.	
Benjamin S., 7.	Run over by cart.	Right leg.	Comminuted bone. Starred and contused wound.	Assellini's box. Recovered 33 days.	
William G., 8.	Run over by cart.	Right leg.	Transverse fracture. Small wound. Great effusion of blood.	Assellini's box. Recovered 51 days.	
John H., 42.	Kicked by a horse.	Right leg.	Transverse fracture. Great ecchymosis.	Assellini's box. Recovered 101 days.	The recovery of this case was retarded, first by diffuse cellular inflammation, and secondly by an attack of phagedæna.

Name and Age.	Nature of Accident.	Limb.	State of Fracture.	Treatment and Result.	Remarks.
William S., 19.	Caught his arm between two cog-wheels.	Right arm.	Comminuted fracture into elbow-joint. Severe laceration of soft parts.	Primary amputation. Recovered 40 days.	
Thomas C., 16.	Fell from a scaffold.	Left leg.	Large wound. Tibia exposed two inches.	Assellini's box. Died 65 days.	Died of pyæmia.
Francis H., 29.	Fell from a tree.	Left arm.	Compound fracture into elbow-joint.	Side-splints. Died 25 days.	Had also fracture of both legs, with extensive bruising, followed by sloughing, for which it was necessary to amputate.
Dennis C., 56.	A large stone fell on his leg.	Right leg.	Small wound, with upper fragment projecting.	Side-splints. Recovered 49 days.	
William T., 19.	Sack of coals fell on his leg.	Right leg.	Transverse fracture. Small wound.	Assellini's box. Recovered 33 days.	
Charles B., 38.	Kicked by horse.	Right arm.	Fracture of olecranon and humerus into joint. Small wound.	Angular splint. Recovered 22 days.	Went out with stiff joint.
Benjamin B., 65.	Fell out of a cart.	Right leg.	Lacerated wound. Bone protruding.	Assellini's box. Died 9 days.	He never rallied after admission. Was constantly delirious.
George B., 38.	Fell out of window.	Right arm.	Bone comminuted into elbow. Wound lacerated.	Angular splint. Recovered 44 days.	Went out with ankylosed joint.
Robert F., 17.	A large stone fell on him.	Left leg.	Wound communicating with comminuted fracture of fibula.	Assellini's box. Recovered 33 days.	
Israel D., 37.	Fell off a ladder.	Left leg.	Punctured wound. Bone comminuted.	Assellini's box. Died 4 days.	He never rallied. Became delirious on the second day.
James C., 54.	Fell down some stone steps.	Left thigh.	Fracture near centre. Punctured wound.	Long splint. Died 23 days.	Died of pyæmia.
Edwin K., 27.	Fell off a gas-tower.	Right leg.	Pote's fracture, with wound 3 in. long into ankle-joint.	Assellini's box. Recovered 72 days.	

Injuries of the joints of the lower extremities were all sprains or contusions, with the exception of one case, and of course those cases where a wound penetrated a joint, and which have already been considered. The case alluded to was one of dislocation of the ankle-joint, produced by the patient's being thrown from a cart, and falling with his leg under him. The tarsus was thrown forwards from the tibia and fibula, and the articular surface of the astragalus could plainly be felt on the dorsum of the foot in front of the joint. The dislocation was easily reduced under chloroform by extension. The sprains include twenty-two of the hip, forty-three of the knee, and seventy-eight of the ankle.

The above completes a short *résumé* of the accidents admitted into St. George's Hospital during the past year.

It remains still to say a word or two with regard to the cause of the accident. Situated as St. George's is, we scarcely ever get any of those fearful accidents which are admitted into some of the other London hospitals. By far the great majority of accidents, in fact about one third of the total number, were what may be denominated "street accidents," consisting of patients who had been run over, of those who had been thrown from vehicles or off horses, and of those who had slipped in walking or running from some inequality in the pavement or from some slippery substance on the ground, principally orange-peel. About one-eighth of the cases were the results of scaffold accidents, falls from scaffolds, ladders, or buildings in course of erection.

A considerable number of cases were the result of intoxication and drunken rows. Some few railway accidents occurred, principally in railway-porters, from their incautiously attempting to unhook carriages whilst in motion.

In our SECOND SECTION, diseases are arranged: first, a class which includes erysipelas, sloughing and gangrene, and pyæmia:—secondly, various other classes of diseases of organs of any special function, consisting of, 1st, diseases of the organs of motion; 2d, of circulation; 3d, of respiration; 4th, of innervation; 5th, of digestion:—and thirdly, classes of diseases of various parts, including, 1st, diseases of the skin; 2d, of the eye, nose, and ear; 3d, of the urinary organs; 4th, of the male generative organs; 5th, of the female generative organs; and 6th, of the blood-glands.

GENERAL DISEASES.—In the first class are included erysipelas, cutaneous and phlegmonous, hospital gangrene, senile gangrene, and pyæmia.

There were forty-one cases of *erysipelas* recorded; of these twenty-six were cutaneous, and fifteen phlegmonous.

The cases of cutaneous erysipelas were for the most part slight, one only terminating fatally. Six of the cases were idiopathic, and twenty traumatic. Eight of the cases followed scalp-wounds; two, wounds

of the face ; one, a wound of the neck ; and one, a wound of the leg. Two occurred in patients suffering from lupus ; one from thecal abscess ; one from inflamed bursa patellæ ; one from ulcer ; two from onychia ; and one case followed the operation performed for ruptured perineum. The treatment adopted was tonics, more especially muriate of iron, the medicine being generally preceded by a brisk saline purge ; and good diet and stimulants.

Fifteen cases of phlegmonous erysipelas were admitted ; twelve of these cases were in the upper extremity, two in the lower, and one in the scalp. Two of the cases appeared to come on without assignable cause ; the remaining cases followed slight wounds, with the exception of two, where the disease supervened upon inflammation of the bursa over the olecranon. Two cases terminated fatally, and in one the limb required amputation on account of the immense destruction of skin and denudation of muscles. The case eventually did well.

Phagedæna has unfortunately been exceedingly prevalent in the wards of this hospital during the past year ; in fact, since 1863 we can scarcely have been said to be free from this disease. In the summer of that year we had a very severe epidemic, as many as ninety-two cases occurring in about three months. As the cold weather came on, the disease subsided, except an isolated case now and then, till the summer of 1864, when it again appeared, and the wards have never been entirely free since that time.

During 1865 fifty-one cases of well-marked phagedæna occurred. Besides these there were a number of other cases of sores which took on a sloughing action, but which were not sufficiently well-marked to be included in the category of hospital gangrene.

There are several points in connection with these cases that are interesting, and well worthy of notice, since they go far to prove that overcrowding, want of cleanliness, ventilation, &c. are not the *only* causes of this disease.

On analysing the cases, it appears that thirty cases broke out in the house, and twenty-one were admitted with the disease : some of these latter had previously been attending as out-patients ; others had never been near the hospital before the day of their admission. Of the cases that occurred in the house, no ward was found to be particularly liable to be visited by the disease ; in fact, in every surgical ward in the house, one or more cases occurred, with the exception of one ; and curiously enough this ward is usually considered one of the worst-ventilated and most unhealthy in the house, being built in the central part of the building, where there is nothing or next to nothing but corridor-ventilation : in the corresponding ward to this on the male side of the house only one case occurred. In connection with these two wards one interesting point demands especial notice ; and that is, that in wards on the other side of the corridor, and opposite these, which are under the supervision of the same nurse, and where the same sponges and surgical appliances are used, several cases of phagedæna occurred.

The greatest number of cases occurred in Fitzwilliam Ward ; but then it must be mentioned that this is one of the largest wards in the house, containing thirty beds, and is moreover the operation-ward.

In every case of the disease the number of the bed was noted in order to endeavour to ascertain if those facing any particular aspect were more liable than others ; but it appears not, the complaint occurring in one part of the ward as frequently as in another ; in only one instance did two cases occur in one bed, and in this the second case did not occur till the lapse of some weeks after the first ; and in the mean time the bed had been occupied by several patients, who had showed no symptoms of the disease.

In August and September of last year the wards were cleansed, whitewashed, and painted, and were kept shut for some weeks ; but without any appreciable effect on the disease. In two wards besides this, new cross ventilators were placed on a level with the ceiling ; and in these two wards cases have been more frequent since than they were before.

With regard to the treatment of this disease : opium was given in nearly every case, and the writer of this report is inclined to think with very great benefit, if stimulants be given at the same time. It must be borne in mind that this disease is accompanied by excessive and very rapid prostration and great deficiency of nervous power ; and if the vital forces be not supported by brandy, wine, and diffusible stimuli, the opium seems to exert no effect, even when given in immense doses.

In illustration of this point, one or two cases may be briefly mentioned. A girl was admitted with a phagedænic sore on September 29th. She was ordered twenty drops of Battley's sedative three times a day ; this was subsequently altered to every four hours, and then to every three hours ; but without arresting the disease till October 6th, when there was an immense sore, and she was in an extremely low condition. She was now ordered some red wine, without increasing the opium ; and on the 8th the sloughing had stopped.

A boy was admitted with an abscess on the inner side of the leg, which was opened, and on November 6th the wound became phagedænic and continued to spread, though slowly, till the 25th, in spite of opium. On this day he was ordered stimulants, and to continue his opium ; and the disease was arrested, the sloughs beginning to separate on the 28th.

Two cases of *senile gangrene* were admitted : in one the disease was arrested, the sloughs separated, and the patient was discharged cured ; in the other most extensive bed-sores formed wherever there was any pressure—on the buttocks, the shoulders, and the heels—and he died of exhaustion consequent on these. One other case of *gangrene* occurred, and is worthy of especial notice, since it occurred in an infant without assignable cause.

An infant, aged nine months, was admitted, with the history that two days before the left hand was noticed to be swollen and red. The

following morning the redness had disappeared from the hand, and the right foot and leg were, to use the mother's expression, "as black as a coal." She stated that the child had been ailing for a fortnight. She had not yet weaned it.

When admitted, the second finger of the left hand was red and swollen. The lower third of the right leg and foot was enormously swollen and of a brownish-black colour; it was covered with large blebs containing a dark fluid. The line of demarcation was abrupt and well marked. The temperature of the upper and lower part of the leg was very different: in the affected part it felt considerably below the normal temperature; whilst above, it was much elevated. The child did not seem in any pain, and there appeared to be no sensation in the affected part. The mother was a slight, delicate woman. She stated that she had not felt strong since her last confinement.

The mother was ordered tonics, good diet, and porter, and the child's leg was wrapped in cotton-wool. In the course of time the leg recovered itself, except a superficial slough, which separated and left an indolent ulcer. The toes, however, all became gangrenous and dropped off.

The child was seen a week or two ago, twelve months after its illness. It then seemed a fine healthy boy. The foot presented a clubbed extremity, as if amputation had been performed at the metatarsophalangeal articulation.

More than the average number of cases of *pyæmia* occurred during the past year; and as they present several points of interest, they have been arranged in a tabular form, in order that the salient points in connection with each case may be seen at a glance.

Among them will be noted three recoveries. The diagnosis in two of these cases was partly made by means of the thermometer, which has proved an important auxiliary in confirming one's opinion as to the nature of the disease. But of this some further remarks will be made later on.

Name, age, and occupation.	Ward; date of admission.	History of case.	Date of first symptoms and progress of case.	Post-mortem.	Treatment and remarks.
1. George C., 21, railway porter.	Fitzwilliam. Jan. 10.	Comminuted compound fracture of leg, followed by sloughing of the wound and ulceration into anterior tibial artery. Amputation on sixteenth day, followed by sloughing of flaps.	First rigor, accompanied by profuse sweating, January 30, followed by prostration and cough. Died Feb. 4.	Several pyæmic deposits in both lungs. Blood fluid; veins of part natural.	Sulphite of soda, stimulants.
2. Jas. B., 20, carman.	Oxford. Jan. 14.	Compound fracture. Extensive sloughing of leg.	First rigor Jan. 18. Constant delirium; profuse sweats. Died Jan. 22.	No post-mortem.	There is some doubt as to whether this was pyæmia. He only had one rigor. Stimulants, bark and ammonia.
3. Chas. B., 41, piano-forte maker.	Harris. Jan. 18.	Was admitted for piles, which were tied Feb. 2.	Feb. 11 he had a rigor, followed by profuse sweating. Raw-beefy tongue, anxious aspect, very quick pulse. The rigors were constantly repeated, and he complained of great pain in chest and oppression of breathing, followed by expectation of purulent matter. The symptoms now subsided, and he eventually recovered. Went on well till March 2, when she had a rigor, followed by sweating; tongue furred and dry; pulse quick; face sunken; wound dry; rigors repeated; abscess formed in shoulder. Died March 19.	Abscess in lungs and left kidney. Blood fluid; stump infiltrated with pus; veins thickened, and filled with pus.	Large doses of chlorate of potass; brandy and wine.
4. Maria M., 24, servant.	Princess. Jan. 25.	Admitted with compound dislocation of elbow, followed by diffuse suppuration. Amputation on fifteenth day (Feb. 9).			

Name, age, and occupation.	Ward; date of admission.	History of case.	Date of first symptoms and progress of case.	Post-mortem.	Treatment and remarks.
5. George D., 23, porter.	Fitzwilliam. Jan. 28.	Compound fracture of arm; primary amputation. Slight sloughing of edges of flaps.	Feb. 10. First rigor, repeated every day: no sweating at first; afterwards, profuse. Stump quite healthy and clean and moist. Died March 5.	Pus in and around shoulder-joint, in the lungs and liver and cellular tissue of pubes; veins of stump healthy; pus in one hepatic vein.	Chlorate of potass, morphia, brandy.
6. Jas. H., 56, carman.	Oxford. Jan. 31.	Admitted with extensive scalp-wound.	Feb. 16. Complained of pain in thigh, and sweated profusely. No rigors; wound clean; tongue white. Died Feb. 19.	Veins of diploë natural. No abscesses in any viscus. Serous fluid in bronchial tubes; large abscess in thigh.	Brandy and morphia. This was a doubtful case of pyæmia. It is referred to under injuries of the head.
7. Thomas H., 19, butcher.	Winchester. Feb. 25.	Abscess over great trochanter, connected with diseased spine. Abscess punctured Mar. 7, followed by inflammation of the sac.	April 14. Slight rigor, followed by great emaciation and sweating. Immense offensive discharge. Formation of bed-sores, and death on May 6.	Secondary abscesses in lungs; recent vegetations on valves of heart. Abscess connected with lumbar vertebrae passing through sciatic notch.	Quinine, wine, and brandy.
8. Hen. W., 36, labourer.	Oxford. Mar. 9.	Wound of the forearm, extending completely through the limb between the two bones.	March 20. Slight rigor; profuse sweats; face jaundiced and sunken; tongue dry. Died April 8.	Secondary abscesses in lungs and spleen; blood fluid. Veins of part natural.	Bark and ammonia; stimulants.
9. Wm. S., 24, plasterer.	Oxford. Apr. 24.	Compound fracture of crest of ilium.	May 16. Rigors and profuse sweating. Gradual emaciation; furred tongue. Died May 27.	Abscess in pelvis. No abscess in any of the viscera.	Stimulants.
10. Aurelius B., 22.	Grosvenor. May 10.	Admitted with disease of spine and psoas abscess. June 16, a se-	June 23. Had a rigor, constantly repeated; foul tongue; very rapid pulse; profuse		Ammonia and salines; quinine; stimulants.

11. Wm. M., 34, coach- man.	Oxford. Jun. 12.	Admitted with disloca- tion of metacarpal bones, and wound on the leg, which was followed by diffuse cellular inflammation.	ton passed through the abscess.	sweating. On 26th effusion into both ankles, and on 27th one knee. Symptoms gradu- ally disappeared, and swell- ing of ankles subsided. He died some months after of bronchitis.	Large abscess in thigh. Abscess in left eye- ball. None in viscera.	Bark and ammo- nia; brandy.
12. Wm. B., 29, carpen- ter.	Fitzwilliam. June 14.	Admitted with pulsating tumour in ham. Liga- ture of artery, June 30. Secondary hamor- rhage, July 10.		First rigor July 3. Pulse very quick; tongue furred. Rapid emaciation. Died July 16.		Stimulants.
13. James H., 57, sales- man.	Harris. June 21.	Admitted with necrosis, followed by phagedæ- na; ulceration into dor- salis pedis artery, and amputation on August 11.		July 15 first rigor. Pulse very quick; profuse sweating; face tinged and anxious. Died July 18.	Broken-down and sup- purating clot in veins. No pyæmic deposits.	
14. Wm. R., 46, carman.	Fitzwilliam. June 27.	Admitted with fracture of both legs, followed by extensive sloughing. Amputation July 2.		First rigor August 16. Profuse sweating, and formation of abscess in thigh and but- tock, and great difficulty in breathing. The abscesses were opened, and he seemed to be recovering, when albu- men was detected in his water. He became weaker, and sank and died Oct. 6.	Serous fluid in right pleura. Lung carni- fied.	Chlorate of po- tass; stimu- lants.
15. Victorina H., 23.	Princess. Sept. 13.	Confined ten months ago, "milk leg" afterwards, and formation of ab- scess. Amputation Oc- tober 14.		First rigor July 18. Great deli- rium and restlessness. Sweats; quick pulse. Death July 24.	No post-mortem examin- ation.	Opium; stimu- lants.
				First rigor October 16. Pulse quick; tongue brown; pro- fuse sweating. Rapid ema- ciation. Died Oct. 22.	Secondary abscesses in spleen. Veins of stump containing brown sa- pinous matter.	Quinine; brandy.

Name, age, and occupation.	Ward; date of admission.	History of case.	Date of first symptoms and progress of case.	Post-mortem.	Treatment and remarks.
16. Maria W., 25.	Holland. May 17.	Transferred from physicians under whose care she had been with acute rheumatism following confinement, and followed by bed-sores and pyæmia.	Date of first rigor not noted. When transferred, there were abscesses in both ankles, both knees, and one hip. Great emaciation; profuse sweating; icteric tinge of skin; quick, weak pulse. The abscesses were opened. She eventually recovered, though the affected joints were stiff.		Quinine and mineral acids; brandy and wine.
17. James B., 34, coachman.	Oxford. Oct. 4.	Admitted with scalp-wound exposing the bone.	First rigor Oct. 20, followed by others. Profuse sweating. Coma and death on the 28th.	Bone infiltrated with pus. Pus in arachnoid and sub-arachnoid cavities. Abscesses in lungs and liver.	Bark and ammonia; brandy.
18. Thos. W., 34, excavator.	Oxford. Oct. 16.	Depressed fracture of skull. Trephining.	First rigor October 27. Great restlessness and delirium; repeated rigors and sweating. Death on Oct. 30th.	Bone opaque, and infiltrated with pus. Pus between bone and dura mater. Secondary abscesses in lungs, and patches of intense congestion in spleen.	This case is referred to in injuries of the head.
19. Jas. C., 54, labourer.	Oxford. Dec. 1.	Compound fracture of leg. Scalp-wound.	Dec. 17, an attack of rigors. Furred tongue, sweating, delirium, pain and swelling of both shoulders. Died Dec. 23.	No post-mortem examination.	Salines and ammonia; brandy; opium.
20. Wm. B., 40, labourer.	Grosvenor. Sept. 19.	Transferred from the physicians in a delirious condition. No history could be obtained.	On transfer there was an abscess over right hip, over elbow, and on left hand. He had no rigors, and died in five days.	Abscess in lungs and in joint between manubrium and sternum. Abscesses in left deltoid and pectoral muscles, and over hip, olecranon, and dorsum of hand.	Stimulants.

The foregoing is a short statement of the cases of pyæmia occurring during last year. It will be seen that there were twenty cases in all, and of these three recovered. Concerning the fatal cases nothing more need be said; but the three recoveries demand some further observation: in the first place, because a successful issue to a case of pyæmia is by no means of common occurrence; and secondly, because the diagnosis, in two of the cases at all events, was by no means certain; and had it not been that the thermometer, which must certainly now be regarded as a means of diagnosis, gave such positive results, these cases would scarcely, perhaps, have been classed in the above list.

From the observations of Dr. Th. Billroth, published in Langenbeck's *Archiv f. Klin. Chirurgie*,* and verified in many instances in this Hospital, it appears that the fever in pyæmia, as denoted by the thermometer, is what may be termed of a remittent type, that is, there are distinct intermissions, the temperature becoming normal, or nearly so, and then again rising; and, moreover, in no other form of secondary traumatic fever is this intermittent type found. In two of the recoveries this state of the temperature was found, viz. in No. 3 and 10. In No. 3 the observations were not made from the commencement of the attack; but they were made sufficiently long to show that the thermometer presented these peculiar changes. In the other case (No. 10) the temperature was taken throughout, from the time of the puncturing of the abscess until the patient was perfectly recovered. It presented four distinct intermissions, the acme or greatest intensity of the first occurring two days before the first rigor, the second being coincident with the first rigor, the third taking place at the same time as the swelling of the ankle, and the fourth three days afterwards. The temperature then gradually assumed its natural standard, contemporaneously with the diminution of the heart's action, the cessation of the sweating, and the cleaning of the tongue.

DISEASES OF THE ORGANS OF MOTION.—This class has been divided into four classes: 1st, diseases of the bones; 2d, of the joints; 3d, of the bursæ; 4th, of the muscles, tendons, and their sheaths.

Of diseases of the *bones* or of their *investing membranes*, 149 cases were admitted during the year. The majority, as might be expected, were instances of caries and necrosis.

Of *necrosis* sixty cases were admitted. A large majority of these cases were the result of blows or injuries of some kind. Three cases were necrosis of the end of the bone after amputation, and four were necrosis of the ends of the bone after excision, in two of the elbow, the operation having been performed in the one instance twenty, and in the other seven months previously; in one of the shoulder, the operation having been performed twenty-two months before; and in the remaining case of the wrist, excision having been performed three months previously.

Of the various bones affected, the tibia and the bones of the skull

* An abstract of this paper will be found in the Year-book of the New Sydenham Society for 1862.

were those most frequently implicated. In one of the latter cases almost the entire calvaria was implicated; the disease was supposed to be syphilitic, in a female aged nineteen, and it seemed clear from the history of the case that the syphilitic virus had been inoculated at the same time that she was vaccinated. In this case, as well as in several others of necrosis, a solution of equal parts of sulphuric acid and water was applied to the exposed bone with the effect of very rapidly dissolving it and producing a healthy surface, which soon cicatrised.

Two cases of necrosis of the tibia were placed on the operating-table on the same day, which much resembled each other, and were of some interest. They were both cases of a sequestrum of bone lodged in the upper extremity of the tibia in a cavity, the cavity being separated from the joint by only a very thin lamella of bone; so that considerable care had to be taken not to wound the joint.

Disease of the short bones and extremity of the long bones, constituting *caries* in all its varieties, presented us with thirty-four instances; examples were seen of all the stages of the disease, from simple enlargement and softening of the bone-tissue down to entire destruction of the bone from suppuration; nine of the cases were abscess within the interior of the bone, and one of these presented an extremely well-marked example of the so-called circumscribed abscess in the extremity of a long bone. The case was that of a female, aged twenty-one, who for some time had suffered from gnawing pain, especially at night, in the lower end of the tibia, and principally in one spot; where was slight discoloration. There was a little enlargement of the bone. Pus was diagnosed, and a trephine applied, with the effect of giving exit to a small quantity of matter and an entire relief of the symptoms.

One case of *caries* of the tarsus terminated fatally after amputation.

Forty cases of *disease of the spine* came under observation; for the most part these cases were admitted on account of some secondary complication, as the formation of lumbar or psoas abscess, or the occurrence of paraplegia. Two of the cases terminated fatally, one of bronchitis, and the other from pyæmia; in this latter case the abscess had pursued a somewhat unusual course, it had descended into the sheath of the psoas muscle; but, instead of pointing in the groin, it had passed down into the pelvis, made its way through the great sacro-sciatic foramen, and presented itself externally over and behind the great trochanter. In this boy there was no external evidence of disease of the spine, and the diagnosis as to the cause of the matter was obscure.

One case, a little girl aged seven, was admitted with lateral curvature, and was considerably benefited by the use of a spinal apparatus.

Twelve cases of *periostitis* were admitted. Of these, five cases of what is termed acute diffuse periostitis are of special interest, and call for particular notice. A narration of one case will serve to illustrate the series, as the symptoms in them all, with one or two trivial exceptions, were identical.

A girl, aged fourteen, was admitted on February 20th. She stated that on the morning of the 17th, on getting up, she found herself unable to stand from pain and swelling of the knee. This had continued and extended up the thigh. She had not been exposed to cold or injury of any kind.

On admission, the left thigh was much swollen, the skin tense and straining, of a wax-like appearance, and acutely painful. There was an enlarged gland in the groin; countenance very anxious; tongue furred; pulse 116; skin hot. Ordered calomel, three grains at bedtime, with house-medicine in the morning; effervescing saline draught, with ammonia, every six hours; a lotion of lead and opium; fish diet.

February 23d.—Swelling was still very great, and the skin red. She was still in great pain, and did not sleep at night. Ordered linseed-meal poultice; iodide of potassium, with compound infusion of gentian, three times a day.

26th.—Had quite lost her former anxious appearance; sleeps better, and suffers much less pain; tumour rather softer, but still extremely painful to the touch.

March 5th.—The tumour was very much softer, and was threatening to point on the inner side of the thigh; she complained of throbbing pain at night. Ordinary diet, and half-a-pint of porter.

The swelling continued to disappear, the threatening abscess became dispersed, and the spot consolidated.

On April 23d the swelling was all gone, except some thickening of the bone, which still remained. She did not suffer any pain, and could bear the weight of the body on the limb. She was therefore discharged, but was nevertheless kept under observation; and some months after her dismissal an abscess was found to have formed on the inner side of the thigh; this burst, and remained open some months; a small piece of bone the size of a pea was then thrown off, after which the sinus healed in a day or two.

This case is particularly recorded, because in it the result was not quite so favourable as in some of the others; for it should be mentioned, that in three of the cases no suppuration occurred, and no exfoliation of bone took place.

There is no doubt that the usual plan of treatment in these cases would have been to have made incisions; and it is equally clear, that if incisions had been made, the result would not have been so favourable; after the incision had been made no pus would have been found, but suppuration must have resulted from the admission of air into the wound, and would doubtless have resulted in necrosis of a portion of the shaft of the bone.

Another case of acute diffuse periostitis presents some points of interest. The case was that of a boy aged thirteen, who was admitted with enormous swelling of the lower part of the thigh; the skin was tense and shining, but there was not much constitutional disturbance. An incision was made into the swelling, but no pus escaped. This

was followed by considerable offensive discharge ; and eventually the synovial membrane of the knee became affected, and suppuration into the joint took place ; entire destruction of the articulation and partial dislocation followed ; but in spite of all this the boy had no constitutional symptoms, and little or no pain. Under these circumstances an attempt was made to save the limb by excision.

Three cases of *tumours connected with bone* were admitted. They all present points of interest. One of these cases was a tumour connected with the scapula, which called for the removal of the entire bone, or rather, when we say the entire bone, we mean with the exception of the acromion process, which was not removed, and which materially added to the symmetry of the shoulders after the operation.

This operation having been performed three or four times before, a detailed account of each stage of the operation is here unnecessary. Suffice it to say that one great source of danger and difficulty in the operation—namely, that of hæmorrhage—was entirely done away with by compression of the subclavian artery. Comparatively little blood was lost. Another novel point in connection with the operation was the manner in which the tumour was detached. Instead of, as has been before done, disarticulating early and detaching from before backwards, in this case detachment was commenced at the posterior border. By this means the mass was easily freed, the parts being more readily got at by holding the mass forwards, and the large blood-vessels were not cut through until the last stage of the operation, when the growth was about to be finally separated.

The history of the case is briefly as follows :

A girl aged sixteen was admitted with a painful growth connected with the scapula, which had existed twelve months, and caused her great pain. It was hard, quite smooth, and uniform on the surface, circumscribed and situated in the infra-spinous fossa, to which it was firmly adherent. Soon after admission an incision was made into the tumour, and exposed bone could be felt. This was followed by immense foetid discharge, excessive prostration, and fits of an epileptiform character. She then had a severe attack of hæmorrhage. From this, however, she rallied and began to regain strength. The tumour nevertheless increased rapidly, and having reached the size of a foetal head, the operation was performed.

The nature of the tumour after the operation was not quite clear ; it was supposed, however, to be malignant. It had apparently sprung from the periosteum, which was stripped off the bone.

The patient had not a single bad symptom after the operation, the wound healing in about three weeks. She was seen three months after the operation, when she was found to have gained flesh and to be in good health. Viewed from the front, the two shoulders were level, and the only appreciable difference was slight flattening, due to wasting of the deltoid. The head of the bone appeared to have a firm socket, in which it rested and had not sunk, the two arms being exactly the same length from the tip of the acromion process. She could move

the arm freely and without pain forward and backwards, but there was very little power of lateral movement. The bone could be easily rotated without inconvenience, and she could use her arm freely in sewing and writing.*

The second case was one of malignant disease of the lower end of the femur, though the true nature was not revealed till the post-mortem examination, the case presenting unusual difficulty in diagnosis. The prominent feature in the case was the presence of a pulsating tumour in the ham, caused by a strain fifteen weeks previously. There was some effusion into the knee-joint, and the skin over it looked white and pasty, and the superficial veins were enlarged. The tumour itself was firm and hard, completely filled up the popliteal space, and was immovably fixed. There was distinct pulsation in it, and an audible bruit could be heard. On making pressure on the femoral artery the size of the tumour was diminished. A spring tourniquet was applied for a week, without materially affecting the disease. The femoral artery was therefore tied in the middle of the thigh. This was followed by secondary hæmorrhage on the twelfth day. The bleeding came from the upper end of the vessel, and was stopped by opening the wound and re-tying the artery. Symptoms of pyæmia now set in, and the case terminated fatally on the twentieth day. After death an encephaloid mass was found growing from the posterior surface of the femur, intersected with spicula of bone. There was a broken-down blood-clot in the vein, and a loose clot in the lower end of the artery.

The third case was one of cystic disease of the lower jaw. The patient had had a tumour, supposed to be an epulis, removed from the same spot in 1864, and the present disease had been growing ever since. When admitted, the tumour was found to be a firm oval growth about the size of an orange, connected with the outer surface of the right inferior maxilla. It was evidently cystic, and there was an indistinct sensation of fluctuation. The tumour, as well as the portion of bone from which it grew, was removed by an incision in the median line. The extent of lower jaw removed was from the lateral incisor tooth on the left side to the angle of the jaw on the right.

The edges of the wound were brought together by means of a new instrument which is intended to take the place of hare-lip pins. It consists of a hollow cone supported on a broad basis and having a number of small slits in its apex. A silver wire is passed through the edges of the wound and brought up through the cone, the basis of which is firmly pressed against the margin of the incision. The wire is then tightened and turned down into one of the slits, and thus the suture is secured and the edges of the wound brought into apposition. This plan has since been adopted in cases of hare-lip, and with very satisfactory results. By it traction is diffused over a considerable space, and not all made on one point, and thus the cicatrice made by the sutures is avoided. Another advantage is the remarkably easy manner

* This patient was readmitted in May 1866 with a recurrence of the disease in the axilla and in the lungs, from which she died two months afterwards.

in which they may be removed, thus doing away with the danger of tearing open or partially separating the edges of a recently-united wound.

One hundred and fifty-five cases of *disease of the joints* were admitted. Of these fifty-five were cases of *synovitis*, chiefly of the lower extremities, but not including the hip-joint, as diseases of this articulation are classed separately. These cases were principally chronic, with the exception of seven due to rheumatism, and seven to gonorrhœa. The cases were for the most part admitted on account of some increase in the severity of the symptoms, owing to some accidental cause. They remained under treatment for a short time, and were sent out relieved, and in many instances re-appeared at some future period with a fresh attack of more acute symptoms. In many cases, however, this class of patients was permanently relieved, the means employed being rest by means of splints and counter-irritation, of which the actual cautery at a red heat, lightly applied every second or third day, seemed the most efficient, in many cases reducing the swelling and diminishing the pain in a marked degree; so much so, that the patients, instead of dreading its application, rather sought for it on account of the ease it afforded them. Another application which was considerably used with benefit was the so-called Scott's bandage. The general treatment consisted mainly, if any was employed, in the exhibition of the iodide of potassium.

One case of chronic synovitis shows that these cases must not be too lightly regarded, as they may sometimes be followed by disastrous results. It was that of a female aged nineteen, who had suffered from chronic synovitis for ten years, with occasional inflammatory attacks. She was admitted for one of these attacks, and being in a bad state of health, the disease ran on to ulceration of the cartilages, abscess in the joint, and eventually necessitated amputation.

Several of these cases occurred in young girls, and were partly hysterical in character, though in all there was some effusion into the joint, in order to warrant their being classed as synovitis. Six cases were, however, admitted where the disease was clearly of a purely hysterical nature.

Ten cases of *ulceration of the cartilages* occurred, all in adults. In eight of these the knee-joint was affected, and in the remaining two the wrist. Six of the cases recovered with an ankylosed joint; two were submitted to amputation; in one amputation was proposed, but refused; and in the remaining case the man was in an advanced state of kidney-disease, and operative interference was therefore considered inadmissible.

The cases of *suppuration within the interior of joints* were nineteen in number. Of these, eleven were in the lower extremities; and in all cases but two, one of the ankle and one of the metatarso-phalangeal joint of the great toe, were of the knee. The remaining eight comprised four of the elbow, two of the shoulder, one of the wrist, and one of the carpal joint of the thumb. Of course the prospect of saving

the joint in these cases was not great, and the failure of treatment led to the question of removing the disease by amputation or excision, when it became evident that the local mischief was killing the patient; accordingly we find that excision of the joint was performed eight times, and amputation five.

The excisions comprise three of the knee, two of the elbow, one of the shoulder, one of the wrist, and one of the carpal joint of the thumb. These cases will, however, be more particularly alluded to hereafter, as well as the five cases of amputation, which consisted of four of the thigh, and one of the leg.

Of the remaining six cases, two were discharged at their own request; one with abscess in the shoulder-joint, in a fair way for recovery; the other evidently dying from empyema, the result of pleurisy; two died in the hospital, one of pneumonia, and the other of well-marked amyloid disease of the kidneys and liver; and two were discharged with every probability of obtaining in time a sound ankylosed joint.

Three cases in which the *ligaments* were principally involved, producing partial dislocation, were also admitted. Fifteen cases of *ankylosed joints* were admitted, the result of some former inflammation. The greater part of these cases were admitted on account of ankylosis having taken place at an unfavourable angle, and in order that a more serviceable limb might be obtained.

The treatment in several cases consisted in forcible rupture under chloroform, and with very good results; in many of the cases where passive motion could be borne, a certain amount of movement being obtained. In other cases the extension made was gradual, by means of rack and pinion, or screw-splints; and in some of the cases it was found necessary to divide subcutaneously contracted tendons and dense bands of fasciæ.

The cases of *hip-joint disease*—forty-seven in number—present a most interesting series of cases; examples of the disease in all its phases being found, from the most incipient commencement to the cases where the joint is riddled with sinuses, and the life of the patient in imminent danger.

The early cases are of especial interest, as showing the admirable effect of rest-treatment. The plan usually adopted is to place the patient under chloroform, and carefully to adapt a well-padded long splint down the outer side of the thigh, making slight extension by means of a perineal strap. The effect of this is almost immediately to relieve pain; and children who were admitted in a state of great febrile excitement, and suffering intense pain—so much that they could not bear to be moved or lie in any position but that so characteristic of acute hip-joint disease—are found in the course of a day or two to be comparatively comfortable, with a cool skin and clean tongue, and suffering little or no pain. They are kept on their backs in this position till all appearance of mischief has subsided, and are then allowed to go about on crutches with a well-fitted leather splint.

Another mode of applying extension was by means of a weight attached to the foot by means of a string which runs through a pulley at the foot of the bed.

One case of hip-disease terminated fatally in a little child aged seven. After death the hip-joint was found to be full of pus; there was turbid serum in the ventricles and tubercle in the lungs. Two cases of excision of the hip were performed; in both it was resorted to as the last chance of saving the child's life, as the disease was evidently killing them.

In one case amputation at the hip-joint was performed for disease of the joint of some standing. The boy was so exhausted by the drain of the disease on his system, the femur was so extensively diseased, and the acetabulum so much involved, that excision was out of the question; amputation at the hip-joint was therefore performed. The boy did well.*

Forty-three cases of *disease of the bursæ* were admitted. Thirty-eight of these cases were inflammation of the bursa patellæ, or house-maid's knee, principally acute in character, and in a state of suppuration or impending suppuration. In the former case, poultices and an early incision was all the treatment employed; and all the cases did well except one, which was attacked with erysipelas. In the latter rest and cold lotions were generally effective in subduing the inflammation and causing absorption of the effusion. In the chronic cases the treatment by blisters was that mainly adopted. One case of solidified, or nearly solidified, bursa patellæ was admitted, constituting a case of bursal tumour.

Four cases of inflammation in the bursa over the olecranon were admitted; and one case, which is classed as abscess in the elbow-joint, really commenced before admission as suppuration in this bursa and extending into the joint.

With regard to diseases of *tendons and their sheaths*, sixteen cases of thecal abscess, twenty-three cases of contracted tendons, and two of effusion in the sheaths of tendons, were admitted.

The cases of *thecal abscess* were principally connected with the flexor tendons of the hand. They do not represent the whole number of these cases, as by far the greater proportion are treated as out-patients. The cases admitted were those in which some secondary evil had arisen, principally diffuse cellular inflammation, or where the finger was destroyed and removal rendered necessary.

Of cases of *contracted tendons* a large proportion were cases of congenital talipes: by means of subcutaneous division of the tendons, and subsequent extension, a cure was ordinarily effected. Some of these cases were the result of former affections of the joints. One case deserves especial notice. It was that of a man aged thirty-seven, who, in 1857, was bitten by a cobra snake; this was followed by a severe illness and formation of abscesses in various parts of the body, and ever since by contracted tendons of the hands and feet. When

* A detailed account of this case will be found at p. 147.

admitted, the tendo Achillis in both feet was contracted, and also the flexor tendon of the great toes ; so that he was unable to put the feet flat on the ground. The flexor tendons in the right hand were similarly affected. The tendons were divided ; and under the influence of extension he obtained much more useful limbs.

DISEASES OF THE ORGANS OF CIRCULATION.—These include diseases of the heart, of the arteries, of the veins, and of the absorbents.

The cases of *disease of the heart* entered are two in number ; one of these occurred in a case of fractured ribs, and was the cause of death. In the other the patient was suffering from œdema of the lower extremities consequent on disease of the heart ; she was more properly a medical case, and was transferred to the physicians.

Three cases of *aneurism* were admitted ; one affecting the subclavian artery, one the femoral in the groin, and one the popliteal. The first case was deemed inadmissible for operation, as the disease was supposed to extend into the innominate vessel, being situated on the right side. Under the influence of rest and medicine the tumour became smaller and firmer, and the pulsation less forcible. The patient was discharged much benefited. The second case was a tubular aneurism of the femoral in the groin, for which the external iliac was ligatured with a silver wire : death occurred on the third day from bronchitis. The third case was one of popliteal aneurism, in which the femoral was successfully ligatured by a silver wire. This patient, a labourer, aged forty-three, was admitted with the history of a severe strain to the knee three years previously, which had not been followed, however, by any untoward symptoms until a fortnight before admission, when a pulsating tumour was felt in the ham. This tumour was a large oblong swelling, completely filling up the popliteal space, which commenced by a somewhat abrupt margin at the upper angle of the space. Throughout the rest of its circumference its margins could not be distinctly made out. It was soft and fluctuating, and could easily be emptied by pressure : there was a distinct and very forcible pulsation and a loud aneurismal bruit. There was very little pulsation in the posterior tibial. Pressure on the femoral entirely arrested pulsation. The heart-sounds were healthy. The first treatment adopted was flexion for a week, without any appreciable difference. Continuous digital pressure was then made for fourteen hours, the pulsation in the tumour being entirely stopped, with the effect of causing some consolidation, the lateral boundaries being more defined, and the sac-wall felt to be thicker. A spring tourniquet was then applied for three or four hours daily for a week ; it was, however, discontinued, because the parts in the thigh being lax and the artery very movable, it was found to become constantly displaced ; so that after having applied it with the greatest care and nearly suppressed the pulsation of the tumour, it was found a few minutes after as violent as before. Various forms of instruments were tried in succession, but none were found applicable. The patient then used to try to compress the artery for himself, but it produced no visible effect.

Then the aid of fellow-patients, assisted by the students, was called in to compress the artery for twenty minutes out of each half-hour during twelve hours of every day. At first this was thought to be producing coagulation rapidly; then the disease remained stationary, but the bruit always continued as loud as ever. At length it became evident that the tumour was increasing in size along the popliteal space of the femur, and it was then determined to tie the vessel. There was nothing observable about the operation, except that the femoral vein was very large and very closely adherent to the artery, lapping round its inner side, and even seeming to lie somewhat in front of it. Much care was required to make a small opening between the vessels so as to get an aneurism-needle between the two. A silver wire was then placed under the vessel and twisted over it with two turns, so as to completely arrest the pulsation in the tumour. After the operation the patient had not a single bad symptom; the wound healed in a fortnight; pulsation was never found to return in the tumour; and when he was discharged, a month after the operation, the aneurism was entirely consolidated and gradually decreasing in size. The man could walk with a stick, but could not quite get his heel to the ground. The ligature did not cause the slightest uneasiness, and on making pressure over the wound, the patient did not complain of any pricking sensation or pain.

One case of *navus* was admitted; a large one, implicating the whole of the lower eyelid; it was removed by subcutaneous ligature.

One case was admitted, the diagnosis of which was exceedingly obscure: it was put down as a case of *aneurismal varix*, in consequence of a congenital communication between the iliac artery and vein.

A female, aged seventeen, was admitted with the history that ever since birth the veins of the right thigh had been noticed to be enlarged, and that the enlargement had gradually extended down the leg. She had been weakly as a child and had suffered from hydrocephalus. When admitted the right leg was much enlarged, being both longer and greater in circumference than the left. The superficial veins were much dilated and stood out like thickened cords under the skin. The femoral vein was also much enlarged, and in it could be felt a very distinct vibratory thrill, which could be traced up to the junction of the two iliac veins in the vena cava, but no thrill could be felt in this latter vessel. A very loud continuous blowing sound could be traced up the vein to the same spot.

Of *diseases of the veins*, *phlebitis* presents six examples. In three of these a somewhat novel procedure was adopted, in order to arrest the passage of the morbid products into the general circulation. They were all cases of inflammation of the superficial veins following wounds, in which generally symptoms of pyrexia and threatening blood-poisoning were present. A healthy part of the vein above the seat of the disease was selected and a needle passed under it, and it was then compressed by a twisted suture over it; by this means the disease was

rendered local; was followed by suppuration in the vein itself, but none of the pus was permitted to get into the general circulation, in consequence of the needle acting as a barrier to the circulation at this point. It is but just to mention that in one of the remaining cases, where the same symptoms were present and where this treatment was not adopted, no evil results followed.

Twenty-nine cases of *varicose veins* were admitted, some complicated with ulcer of the leg. In many of these cases an operation was performed for their radical cure; the operation consisting in subcutaneous division of the vein, the vessel being compressed above and below by a hare-lip pin placed under it and a piece of elastic over it. In no case was this operation followed by any evil results, except in one case, where, in consequence of the vein dipping under the fascia, the needle transfixed the vessel instead of passing under it. This case was attacked with phlebitis, and is one of the three cases mentioned above, where the vein was compressed in a healthy part.

Of diseases of the *lymphatics*, twenty-six cases of *suppurating glands*, venereal or otherwise, six of *inflamed absorbents*, and two of *tumours of glands*, were admitted. These two latter cases were both in the glands of the neck. One was malignant, and terminated fatally; the nature of the other case was uncertain.

DISEASES OF THE ORGANS OF RESPIRATION.—The cases classed under this heading were of course all secondary complications upon some surgical injury or disease. Two were cases of injury; one fractured patella, followed by bronchitis; the other scald, followed by laryngitis; the remainder were diseases.

They comprise one case of *laryngitis*, for which tracheotomy was performed, which terminated fatally from pneumonia; five of *bronchitis*, of which three died; three of *phthisis*, all of which died; two of *pleurisy*, one of which recovered, the other was discharged at the request of the friends; and three of *pneumonia*, all of them terminating fatally.

DISEASES OF THE NERVOUS SYSTEM.—This class comprises those of the brain and its membranes, and those of the spinal cord and its membrane.

Among *diseases of the brain* are found five cases of *epilepsy*. These were admitted into the surgical wards in consequence of the patients having fallen down in an epileptic fit and injured themselves. One case terminated fatally—a boy who had been subject to epileptic fits from birth, and was moreover an idiot, who had fallen down and broken his thigh. After death the skull was found to be very thick, a large quantity of fluid was found in the ventricles, and the dura mater was very adherent to the bone.

Five cases of *inflammation of the brain or its membranes* occurred, four of which were the consequence of injuries to the head; and in the remaining case there was some history of a fall, but after death tubercular matter was found at the base of the brain.

Seven cases of *delirium tremens* occurred in patients who had been

admitted on account of some accident. Four of the cases terminated fatally.

One case of *apoplexy* was admitted into the surgical wards, as he was brought in with the history that he had been knocked down by a horse, which he was holding, suddenly starting.

Two other cases of *disease of the brain* were admitted. In both of these the symptoms were most probably due to chronic thickening of the bone and membranes, the result of a former accident.

One case of *convulsions* was admitted, in a little child, who was reported to have fallen out of its nurse's arms.

Two cases of *neuralgia* were admitted; one following a blow on the arm, the other most probably due to syphilitic deposit within the skull.

One case of malformation, or *meningocele*, was also admitted.*

Diseases of the *spinal cord and its membranes* include six cases of *partial paralysis*, two of *infantile paralysis*, and one of *inflammation of the membranes* in a male aged 19, who was admitted with paraplegia and intense hyperæsthesia of the lower extremities, and was subsequently attacked with the same symptoms in his arms. He died; and after death the membranes covering the cervical portion of the cord were found to be much thickened, especially behind, causing pressure on the cord itself. The inflammation appeared to be of a scrofulous nature, as tubercle was found in the neighbourhood.

DISEASES OF THE SKIN.—In this class are first, eruptions, of which *eczema* was by far the most common, thirty-one cases of this disease having been noted during the past year. Some of these cases were pure examples of acute eczema; others were chronic eczematous eruptions occurring in conjunction with some other disease; and again, others were what may be termed eczematous ulcers, commencing as eczema about the legs, and after a time the vesicles forming small round ulcers, as if portions of the skin had been punched out. One case of eczema terminated fatally from an attack of pneumonia.

The next most common eruption was *rupia*, of which there were ten examples. This does not include rupial ulcer, this disease being classed with the other forms of ulcer. One case of *rupia* in a female terminated fatally from exhaustion consequent on bed-sores. The woman was advanced in life, and when admitted there was not a square inch of her body which was not covered with *rupia*, either in the form of pustules or scabs. No satisfactory history of primary syphilis could be obtained; but under the influence of calomel vapour-baths and iodide of potassium the eruption began to disappear. She was, however, in a very weak and low state, with large bed-sores, which eventually proved fatal.

Lupus presented five examples. In one of these cases, where it had existed for years, the disease disappeared after an accidental attack of erysipelas.

Six cases are put down as cases of *scabies*; but concerning two of them some doubt exists, as they did not appear to present all the cha-

* An account of this case will be found at p. 36.

racters of this disease. In external appearance they resembled scabies exactly, and they occurred for the most part on the thin parts of the skin—in the flexures of the joints; and they were both cured by sulphur ointment. There was no itching, however, and the disease was not apparently contagious. The *sarcoptes hominis* was not found in either case, but only a cursory examination was made for this parasite.

Several other eruptions presented us with a single example, viz. *herpes*, *lichen*, *impetigo*, *psoriasis*, *lepra*, *purpura*, and *pemphigus*.

Concerning *ulcers* of the leg nothing much need be said. One hundred and fifty-three cases were admitted. These presented all the various varieties of this disease both specific and non-specific. Four of the cases terminated fatally; in two the ulcer was a sloughing one, and occurred in old women; in the other two death took place within twenty-four hours of admission, both cases being admitted in a moribund condition.

Sixty-four cases are classed together as *abscesses*. These are a somewhat heterogeneous class of cases, as there are massed together all abscesses, acute and chronic, large and small, for which no definite cause could be assigned, or which occurred after blows and slight injuries. Several of them proved of a very troublesome nature, and in three cases terminated fatally from excessive discharge occurring in weakly constitutions, or, as in one case, in a patient previously reduced by fever.

Ten cases of *cancerous ulceration*, in the form of epithelioma, occurred. In four cases it occurred in the leg. In two of these amputation was performed, and in two the diseased mass was removed; in one of the latter cases the patient being re-admitted seven months after, with a return of the disease in the groin, from which she died. Another case also terminated fatally with cancerous ulceration in the groin. Two cases of epithelioma of the penis were admitted, requiring removal of that organ; and two of the labia; in both of which cases the diseased mass was successfully extirpated. One case of epithelioma of the lower lip also occurred. The diseased mass was removed by a triangular incision.

Tumours, connected with the skin and subcutaneous cellular tissue, without reference to any special organ, present us with twenty-one examples; of these six were fatty, seven sebaceous, three others encysted growths, two malignant, and three recurring tumours. Among the six fatty growths, four occurred on the shoulders, the usual seat of this disease, one in the neck, and one on the buttock, over the tuber ischii; they were all successfully removed. Three of the sebaceous tumours were connected with the scalp; the others on the buttock, side of neck, shoulder, and leg respectively. Besides these, three other cystic tumours were admitted; one of these in a female aged twenty-two was a large cyst in the neck, probably a degenerated scrofulous gland; she had been in the hospital several times before, and had had the tumour punctured, and on one occasion laid freely open, but without benefit. A silver wire was passed through the

cyst, and allowed to remain there some weeks, with the effect of entirely curing the disease. The two other cases of encysted tumours were both small cysts situated on the inner side of the arm and connected with the biceps muscle. Both were laid freely open, and allowed to granulate from the bottom.

Besides the cases of epithelioma already alluded to, two cases of *malignant disease* were admitted, affecting the extremities.

One was a case of encephaloid disease of the upper part of the arm occurring in a woman aged fifty-nine, for which amputation through the shoulder-joint was performed, and which terminated fatally. The swelling had existed for two months when she came under notice, and it then presented a sensation of fluctuation; it was punctured, and about two ounces of yellowish serum escaped. The tumour increased very rapidly, and four months after its first appearance amputation was performed; death occurred on the fourth day, from supposed fatty heart.

In the other case the disease was also supposed to be encephaloid, but no opportunity was afforded of verifying the diagnosis, as the seat of the disease rendered it ineligible for operation. The patient was discharged as incurable, and was lost sight of. The swelling had existed nine months, and was attributed to a slight wrench; it was situated in the axilla, completely filling up this space, and projecting below the lower border of the pectoral muscle.

Three cases of *recurring tumour* were admitted; two of these were recurrent fibroid tumour; the one occurring in the thigh, and for which amputation at the hip-joint was performed;* the other occurring in the abdominal wall. The third case was one of some interest. It belonged to a class of tumours which, as a rule, are not apt to recur after complete removal, namely, myeloid. The patient, a woman, aged twenty-five, had been the subject of the disease for six years; and during that time the tumour had been removed four times, and had returned. When admitted, in the early part of the year, there was a large lobulated tumour over the left shoulder; this was removed. It was found to be adherent to the periosteum over the spine of the scapula, from which it appeared to spring. When examined microscopically after the operation the tumour was found to consist of elongated and nucleated cells, regular in shape and size, and numerous rounded cells, each containing from six to ten nucleolated nuclei. Subsequently the disease returned, and six months after the former operation she was readmitted, and the tumour again removed; it had now grown under the trapezius muscle, and dipped down between the clavicle and scapula, prolonging itself upon the brachial plexus and axillary artery. The wound healed rapidly after this last operation, and the woman was discharged, but it was reported that she died soon after of some acute disease.

One case of *cancer of the skin* proper, and one of *keloid* ulceration, were admitted. The cancer of the skin was a case of melanosis of the

* A full report of this case is given at p. 138.

face and lower eyelid, and was interesting from the fact that the patient, a female aged fifty-six, had had the globe of the eye removed seven years previously for melanoid disease of that organ. She had remained well until sixteen months before her second admission, when the disease had reappeared on the face, and had increased slowly. One case of *elephantiasis* of the foot and leg was admitted, and was materially benefited by the application of pressure by means of sheet-lead and by a strong solution of corrosive sublimate. Among diseases of the skin and its appendages are also included four cases of *carbuncle*, all of which were treated by the crucial incision; five *boils*, nine cases of *œdema*, three of *contracted cicatrices*, five of *onychia* and ingrowing toe-nails, and three of *corns and bunions*; of these nothing more than a mere enumeration need be given.

DISEASES OF THE EYE.—Of these there were sixty-three cases; presenting us with examples of all the more common forms of these diseases. Thus, of purulent *ophthalmia* there were seven cases, most of them due to the contagion of gonorrhœal matter. Seventeen cases are classed as *corneitis*; these include ulceration of the cornea, strumous or otherwise, and opacity in all its forms. Eleven cases of *iritis* were admitted: some syphilitic, some rheumatic, and some due to exposure to cold. There were eleven cases of *opacity of the lens*; the operation of extraction was performed in four cases, and of solution in one. The remaining cases were slight ones, dimness of vision only being complained of, and were not therefore subjected to any operation. Six cases are placed down to *amaurosis*; in one of these the loss of sight was due to atrophy of the retina accompanying Bright's disease. Three cases of *suppuration within the eyeball*, and one of *suppuration in the lachrymal sac*, are also recorded. Affecting the lids were three cases of *entropion*; one of *granular lids*; and three of *sebaceous tumours*.

One case of *otorrhœa* was admitted, in a little child after scarlet fever.

Six examples of *diseases of the nose* were admitted; these included three cases of *polypus*, two of severe *epitaxis* requiring plugging of the nostril, and one of *ozæna*. In one of the cases of *polypus* the tumour had been removed seven or eight times, and had always returned. It was fibrous in nature, and was probably connected with the basilar bone, as it extended into the pharynx. The friends of the patient would not consent to any more formidable operation for its permanent cure.

DISEASES OF THE ORGANS OF DIGESTION.—These are divided into two classes; first, diseases of the mouth, and secondly, diseases of the remainder of the alimentary canal. Among diseases of the mouth are found five cases of *alveolar abscess* connected with caries of the teeth: all recovered after removal of the diseased teeth: in one case as many as eighteen stumps required removal. Three cases of *ulceration of the mucous membrane* of the mouth were admitted; two of these were strumous in their origin: the cause of the third is uncertain, owing to the woman being unable to give any history of herself, in conse-

quence of her moribund condition when admitted. The disease occurred in a healthy woman, aged twenty-three; and the only thing which could be ascertained was that she had been quite well till three days before admission, when symptoms resembling profuse ptyalism had come on, and also that another person residing in the same house had been similarly attacked, though in a minor degree. When admitted, the right side of the face was enormously swollen, the skin in the buccal region was hard, tense, and shining. There was immense foetid discharge from the mouth, and the mucous membrane was covered with a brawny, honeycomb ulceration. She was in an extremely low state when admitted, and died in about forty-eight hours.

One case of *fissure of the palate* was admitted, for which staphyloraphy was performed; the palatine muscles being first divided by transfixion of the soft palate. The case was one of congenital malformation, affecting only the soft palate, in a girl aged fourteen. She went out cured on the ninth day.

Six cases of *hare-lip* were admitted; in all the cases the cleft was double, except in one, and in this the fissure was situated on the right side: they were all submitted to the ordinary operation, and recovered.

Two cases of *epulis* were admitted, in both the morbid growth was removed.

One case of *enlarged tonsils* was also admitted, in order that the hypertrophied growth might be removed.

One patient was admitted complaining of violent attacks of *dyspnœa*; the larynx and chest having been carefully examined and no disease found, it was thought that the attacks might be due to an elongated uvula; the end was therefore removed; and whilst the patient remained under observation he had no more attacks.*

One case of *cancer of the lip*, already referred to, and two of *cancer of the tongue*, were admitted. Concerning these two latter cases the diagnosis is somewhat uncertain, as neither presented that amount of deposit around the edges of the ulceration which is usually observable. One went out somewhat benefited; the other died of symptoms resembling cancer of the stomach. No post-mortem examination was made.

Among diseases of the remainder of the alimentary canal come first *hernia*: of this there were forty examples; thirty strangulated, four reducible, and six irreducible or incarcerated. Of the thirty strangulated herniæ fourteen were reduced without operation; all inguinal and in males, except one femoral in a female, reduced under chloroform. In all these cases reduction was effected, after the application of ice for two or three hours, by gentle taxis. Sixteen cases were submitted to operation; of these five died. Seven cases occurred in males, nine in females; four were cases of oblique inguinal hernia, all in males and all recovered. In three the sac was opened, in one it was

* This patient was readmitted in 1866 into the medical wards, where he died. At the post-mortem examination he was found to be suffering from intra-thoracic cancer.

not opened. Eleven were cases of femoral hernia ; three in males, eight in females : five died ; three of peritonitis, one of profuse suppuration in the sac and exhaustion, and one of collapse. The sac was opened in every case. One case of umbilical was operated on, a male who recovered. Among the cases may be mentioned a female, aged seventy-two, who had been operated on twice before for the same disease on the same side. She recovered without a bad symptom. A female, aged fifty-five, who had had the taxis repeatedly and violently applied, and in whom the gut was gangrenous. She died of peritonitis. A man, aged fifty-nine, who had been operated on once before. A man, who recovered after very extensive diffuse cellular inflammation and suppuration in the scrotum and surrounding parts. A woman, aged fifty-seven, in whom taxis had been applied six times, and in whom the gut was gangrenous and rotten ; it was opened and stitched to the edges of the wound. The case terminated fatally in a few hours. A woman, aged seventy-five, who was discharged on the twentieth day quite well, the wound having almost all healed by the first intention. In six of the cases omentum, as well as gut, was found in the sac ; it was removed in three.

Two cases of *artificial anus* were admitted : one the result of colotomy performed five months previously, and the other resulting from a protrusion of the gut through the abdominal wall at the umbilicus in an infant, and the subsequent sloughing of the coverings. In the first case the patient, a male, had suffered from symptoms of stricture of the rectum for some time, followed by the formation of an opening between the rectum and bladder, and the discharge of his fæces through the urethra, causing him great annoyance and suffering, for which the colon was successfully opened in the left loin. He was simply admitted into hospital in order that he might be fitted with a proper instrument.

The other case was that of an infant, aged thirty days, who had been born with a protrusion at the umbilicus. The skin over it sloughed on the fifteenth day, and from that time the motions passed through the opening thus made. When admitted, there was a protrusion at the umbilicus, from a prolapse of the gut through the fistula, and in it were two openings, the upper and lower apertures of the gut. A probe passed into either opening showed that the two portions of intestine were almost at right angles with each other. A Dupuytren's enterotome was applied, and on the third day the motions began to pass per anum. This they continued to do for four days, when the child got symptoms of peritonitis, and died on the tenth day after the operation.

Eleven cases of *ulceration of the rectum* were admitted : nine of them were ordinary cases of fissure, and the remaining two were cases of strumous ulceration, in which, on introducing the finger, the mucous membrane could be felt extensively ulcerated, but without any contraction of the calibre of the canal. They both occurred in highly scrofulous patients, and in both were complicated with phthisis.

Twenty-one cases of *fistula and abscess* connected with the anal orifice were admitted : in these the ordinary treatment was adopted.

Thirteen cases of *piles* were admitted, and two of prolapsus ani.

Ten cases are put down as *stricture of the rectum* ; but this is somewhat erroneous, as one case was simply congenital contraction of the anal orifice, only requiring a few incisions in the margin of the anus.

Of the remaining nine cases two were fibrous, both relieved by the passage of bougies ; two were scrofulous, both died ; and the remaining five were malignant. Four of these were discharged as incurable ; the remaining one—complete obstruction having taken place—was submitted to the operation of colotomy, the colon being opened in the left loin. Death occurred on the third day from peritonitis.

DISEASES OF THE URINARY ORGANS.—These cases present us with diseases of the kidney, of the bladder, and of the urethra.

Three cases of *albuminuria* are noted. Some other cases occurred, but as this was quite independent of the disease for which they were admitted, they are not specially noted. One of the three cases occurred in connection with amaurosis ; in one it was the cause of death after excision of the knee, and in the third the disease of the kidney was so far advanced as to forbid amputation in a very severe case of ulceration of the cartilages of the knee, with destruction of the joint.

Three cases were diagnosed as *calculus in the kidney*, though no opportunity was afforded of verifying the diagnosis in either case.

One case of *congenital extroversion of the bladder* was admitted, in an adult male. An attempt was made to cover the bladder with lateral flaps borrowed from the neighbouring parts of the abdomen. This was attended with partial success only, for in consequence of a severe attack of pneumonia after the operation, the patient became exceedingly lowered, and a portion of the flaps sloughed. A narrow bridge of skin, however, remained and healed ; at a future operation an attempt will be made to implant a further flap into this bridge.

One case of acute *inflammation* of the bladder terminated fatally. No post-mortem examination was made.

Seven cases of *irritable bladder* occurred, principally in children ; they were relieved by the use of tonics, of which the muriated tincture of iron was the one chiefly employed.

Five cases of *hæmaturia* were admitted ; in all the blood was supposed to come from the bladder, and in one was presumed to be connected with a fungous growth within the bladder. With the exception of this case they were all relieved by the use of styptics taken internally, and by rest and quiet.

Three cases of *stone in the bladder* were admitted. Two of these occurred in children, aged four and nine respectively, and in both the stone was successfully removed by lithotomy. The third is a case of interest both on account of the attempted employment of a new instrument, and also on account of the large size of the stone.

The patient was a male, aged forty-two, a native of Northampton, who had suffered in childhood from symptoms of stone, but which

afterwards ceased, and left him free till within the last ten years, when he had experienced a recurrence of the symptoms. When admitted, a large stone was detected, and in consequence of its size, lithotomy was determined on. The patient having been placed on the table, an instrument consisting of two blades, like an ordinary lithotrite, was passed into the bladder. The lower blade of the instrument was deeply grooved on the right side, the groove terminating abruptly a short distance from the commencement of the curve in the blades. With this instrument the stone was seized and drawn forwards as far as possible. The ordinary incision was now made, and the knife carried along the groove as far as it would go. An attempt was now made to protrude the stone by inclining the handle of the instrument towards the patient's belly, and thrusting the lower end forwards and downwards in the direction of the pelvic outlet; but in consequence of the large size of the stone, it was found impossible to force it through the outlet thus made; the instrument was therefore withdrawn, and the operation proceeded with in the usual manner. Two stones were extracted weighing respectively four ounces and one drachm, and half an ounce. The man recovered, and was discharged about six weeks after the operation.

One man was admitted with *scrofulous disease* of the bladder. The prominent symptoms were great irritation, and the passage of curdy pus, with occasionally small masses of tuberculous-looking matter. On passing a sound, the mucous membrane was felt to be roughened.

Five cases of *vascular tumour of the female urethra* were admitted, causing great pain during the act of micturition; they were relieved either by the application of nitric acid, or by dissecting out the diseased part.

Forty-seven cases of *stricture of the urethra* were admitted; of these, thirteen were complicated with urinary abscess. Of the thirty-four uncomplicated cases, thirty-two were treated by gradual dilatation by the passage of bougies. Many of them were admitted with complete retention, which was relieved by opium and a warm bath, and after being kept quiet in bed for a day or two and purged, it was generally found possible to introduce a small instrument into the bladder, and the ordinary treatment was then carried out. In the remaining two cases it was found impossible to pass any instrument. The operation of tapping by the rectum was therefore performed, and a couple of days after a small instrument was got through the stricture and tied into the bladder; the remaining part of the treatment was comparatively simple. One patient, after the introduction of a catheter, died somewhat suddenly of fatty heart.

The remaining thirteen complicated cases were treated much in the same way, by the daily introduction of catheters with success, except in two instances, where, in consequence of the gristly state of the stricture and the swelling and infiltration in the perineum, it was thought better to perform perineal section. In one case the sinus was urethral, and was the result of the incision of a stricture in the spongy

portion five years previously, the wound having never healed. The edges were pared and brought together with silver sutures, but without material benefit. Two of these patients died; one of peritonitis, in consequence of diffuse pelvic suppuration connected with a large abscess in the prostatic portion of the urethra. The other was admitted in a moribund condition, and died in a couple of days.

Three old men were admitted with *enlarged prostate*: two of them died, apparently from exhaustion and old age, probably mixed up with a certain amount of uræmic poisoning.

Four patients were admitted with *extravasation of urine*: in two the cause of the effusion was stricture, in the other two it was an abscess pressing on the urethra, and so occluding it; the abscess in one case was in the ischio-rectal fossa, the other in the perineum: the reason of the formation of the matter could not be ascertained in either case. All four patients recovered in spite of extensive sloughing which took place. In the two cases arising from stricture it was found necessary to perform perineal section before an instrument could be got into the bladder; in the other two cases an instrument was easily passed, after the abscess had been evacuated.

DISEASES OF THE MALE GENERATIVE ORGANS.—This class furnishes us with eighty-three cases: among them were thirty-six cases of *syphilis*; fourteen in its primary, and twenty-two in its secondary form. The most interesting point in connection with these cases was a few experiments which were made with regard to syphilisation. In one case the patient was inoculated from a suppurating sore in the groin, and went through a series of ten inoculations, after which no further result could be produced. In three other cases, where the patients were suffering from undoubted Hunterian chancres, no result could be produced, in spite of repeated attempts, and after the sores had been made to secrete pus by means of savine ointment.

Nine cases of *gonorrhœa* were admitted on account of their being complicated with some other disease, viz. in seven with rheumatism, in the remaining two with ophthalmia.

Two cases of *warts*, the result of venereal disease, were admitted, and two cases of *phimosis*.

Eight cases of *hydrocele* were admitted: six of these were subjected to the operation for the radical cure, with beneficial results, except in one case, which terminated fatally, and is of considerable interest. The patient was advanced in life, and the mode of operation adopted was the introduction of a number of silver wires; this was followed by very acute inflammation and suppuration in the sac of the tunica vaginalis. Subsequently he was attacked with retention of urine, the result of an abscess in the perineum, which burst into the urethra: cystitis now supervened, from which he died.

Seven cases of *varicocele* came under observation: they were all submitted to the operation for the radical cure by subcutaneously dividing the vein, compressed above and below by a hare-lip pin and elastic band. In all the operation was successful.

One case of *neuralgia testis* is recorded. The man was suddenly seized with most intense pain in the testicle, which, however, passed off in a few days, under the influence of subcutaneous injection of morphia.

Twelve cases of *acute inflammation of the testes*, the result of blows or gonorrhœa, were admitted, and two of *chronic* inflammation or *sarcocoele*, the result of syphilis. One of these latter cases was interesting. When admitted the man was placed upon a course of mercury, but without affecting the disease in the slightest way. After a time this was omitted, and blue ointment was applied locally; the effect was immediate, and from that date the man steadily improved.

Three cases of *cancer of the penis* were admitted, and were subjected to the operation of amputation of that organ. In one case the operation was performed with a knife, in another by means of an *écraseur*. In the remaining case an attempt was made to operate with the same instrument; but unfortunately the chain of the instrument broke in the middle of the proceeding, and the operation was therefore completed with the knife.

One case of *cystic tumour of the breast* completes our list of cases of disease of the male generative organs. The tumour was removed, and was followed by extensive sloughing and repeated attacks of secondary hæmorrhage, and the patient died of exhaustion on the eighteenth day.

DISEASES OF THE FEMALE ORGANS OF GENERATION.—These cases comprise, 1st, diseases of the breast; and 2dly, diseases of the uterus and its appendages, with the external organs of generation.

Diseases of the *breast* present us with seven cases of *abscess*, and eleven cases of *tumour*. The *abscesses* were in three cases milk-abscesses, occurring during lactation, and in the other four simple abscesses, resulting from exposure to cold.

The *tumours* of the breast comprised seven cases of scirrhus; two of sero-cystic sarcoma; one of fatty, and one of chronic mammary tumour. Amputation of the breast was performed in six cases; in four of the cases of scirrhus, and in the two cases of sero-cystic diseases: in two of the remaining cases of cancer the disease was too far advanced to permit of the operation, and in the remaining case the woman would not submit to the proposed operation. The fatty tumour and the chronic mammary were simply dissected out.

Diseases of the external organs of generation present us with four cases of *abscess* and two of *epithelioma* of the labia, and four cases of *condylomata*. In one of these latter cases the patient was admitted in an advanced stage of phthisis, from which she died.

Twenty cases of *venereal disease* were admitted into the female wards, comprising seven cases of *gonorrhœa*, admitted on account of some secondary complication; four of *primary*, and nine of *secondary syphilis*. The reason of the smaller number of female patients admitted with this disease in comparison with males is that unmarried women are not admitted. One case of *leucorrhœa* is also recorded, having been accidentally admitted under the surgeon.

One case of *congenital malformation* about the pudenda came under notice. This consisted in an entire absence of perineum, the vagina and rectum terminating in one common orifice: the sphincter ani was deficient in front: the opening was partially covered over by a band of integument.

Four cases of *ruptured perineum* were admitted; in none did the laceration extend completely through the sphincter ani; but in one it was deemed advisable to attempt an operation, inasmuch as the patient suffered from prolapsus uteri, and was unable to retain a pessary. In this case the operation was successful, though it was followed by an attack of erysipelas.

Diseases of the uterus and its appendages present us with two cases of *prolapsus uteri*, one of *inflammation of the os and cervix uteri*, one of *fibrous tumour*, and five of *ovarian tumour*. The case of fibrous tumour is of great interest, inasmuch as this disease was supposed during life to be ovarian, and an attempt was made to remove it. The disease had been noticed to commence four years previously, as three small tumours, one at the umbilicus and one on either side; the disease had progressed slowly at first, but for some short time before admission very rapidly.

When admitted, the abdomen was uniformly and enormously distended, the parietes being quite tense. No distinct fluctuation could be felt in any part, except just to the right of the umbilicus, and the abdomen was uniformly dull on percussion. On examination by the vagina, a hard irregular mass could be felt in front of the uterus, filling up the pelvis, but not apparently connected with the womb. This organ itself was not enlarged, and the finger could be passed between the anterior wall and the mass.

Shortly after admission, in consequence of the impairment of respiration, the tumour was tapped, but only a small quantity of fluid escaped. As she was extremely desirous of having something more done, extirpation of the tumour was attempted. An incision six inches in length was made, and the tumour exposed. It was found to be solid. The incision was therefore extended, and the adhesions broken down. They were exceedingly firm, and glued the tumour to all the abdominal viscera. In consequence of the extremely faint condition of the patient, the operation was proceeded with more quickly than was compatible with her safety; and in forcibly tearing through some adhesions, the bowel gave way. The operation was, however, completed; what seemed to be the pedicle was transfixed with a silver wire and tied, and the tumour separated. In the pelvis was seen a mass connected with the uterus, and which was supposed to be a fibrous tumour. She never rallied from the operation, but died in three hours.

Upon examination after death the pedicle was found to be adherent to the anterior wall of the uterus. Imbedded in this organ were several round tumours of fibrous tissue, and attached by a narrow neck to the fundus was a large tumour, very much the size and shape

of a spleen, consisting (microscopically) of fibrous tissue, imbedded in which were oat-shaped nuclei.

Of the five cases of *ovarian tumour* two were submitted to the operation of ovariectomy, with one success, and one death.

The successful case was that of a patient aged twenty-five years, unmarried and in good general health. The disease had been noticed less than two years. She had been tapped more than a dozen times, and above sixty gallons of fluid withdrawn. The fluid was at first perfectly clear and limpid, and contained a very small quantity of albumen, but gradually got thicker and more albuminous. The abdomen always rapidly filled again, and of late, especially after the last tapping, there were distinct symptoms of peritoneal inflammation. The tumour consisted in the main of one large cyst, as was proved by the readiness with which fluctuation was communicated from any one part of the abdomen to any other, when it was distended; but there was also some other, for on examination after tapping, a soft, movable, lobulated swelling, like a bunch of small cysts, could be felt on the right side of the abdomen, and this appeared to be fixed in position.

The patient obtained no permanent relief from paracentesis, and in fact hardly any temporary relief, for the tumour would regain its former size in about six weeks. The symptoms of peritonitis also, and the redness around the puncture, showed that tapping would not be borne with impunity much longer. She was recommended, therefore, to submit to the operation of excision, which was accordingly performed on March 27th in one of the hospital wards. The ward had been previously well heated and the air moistened with steam. The incision, which lay entirely below the umbilicus, was between six and seven inches in length, but after her recovery measured probably less than three. The large cyst was so firmly adherent to the anterior wall of the abdomen, that it was necessary to divide many of the adhesions with the knife. This being done, there were no further obstacles to the delivery of the tumour. The pedicle was short and funnel-shaped. It was transfixed with a stout silver wire, which was then firmly twisted on either side, and the tumour separated. The pedicle and silver wire were then dropped back with the pelvis. None of the abdominal viscera were seen during the operation, except a small portion of the small intestine, which was congested. The other ovary was ascertained to be healthy. The wound was brought together with six silk sutures, the peritoneum being avoided.

Recovery ensued with no drawback, the only unfavourable symptom being pain from flatulent distension of the bowels and constipation during the first few days after the operation.

The other case of ovariectomy was unfortunately not successful. The disease had existed five years, and during that time paracentesis had only been necessary once. The operation was undertaken entirely on account of the very strong desire the woman expressed to have it performed, as she was incapacitated from following her avocation.

The operation was easily performed, since no adhesions existed; and the case seemed a peculiarly favourable one. Symptoms, however, of low peritonitis came on, and she died in about forty hours.

The remaining three cases of ovarian disease were not submitted to operation.

Fifteen cases have been recorded as cases of *hysteria*. They principally simulated joint or spinal disease, and complete our list of female generative organs.

One solitary case of *goître* completes this brief *résumé* of the practice of surgery at St. George's Hospital during the past year.

In conclusion, a few remarks are deemed necessary on some operations which have not been touched upon in the foregoing paper. And first and principally we would refer to the failure of rest-treatment in diseases of joint, leading to the question of removing the joint by amputation or excision. This necessitated operative interference in twenty-one cases, and in twelve of these the operation of excision was the one resorted to. In determining the question as to whether excision or amputation should be performed, the wishes of the patient were allowed to materially influence the determination of the surgeon. In two or three cases which were deemed admissible for excision the expressed wish of the patient for amputation was considered sufficient to justify the surgeon in resorting to this latter operation.

The twelve cases of excision comprise two of the hip, four of the knee, four of the elbow, one of the wrist, and one of the thumb.

Taking them in the order enumerated; the first one of the hip was in a boy fourteen years of age, in whom the disease was comparatively recent, being only of twelve months' duration; abscesses having only existed three months. The operation was performed by a longitudinal incision: the acetabulum was found not to be much diseased. He was treated after the operation without splint. Seventy days after the operation there was very fair union, and he could raise the limb off the bed without assistance; he could walk on it a short distance. The pelvis was very oblique, and this gave the appearance of about two inches shortening; in reality there was very little, if any.

In the other case of excision of the hip the operation was resorted to as a last chance; the patient, a little girl aged six, was literally dying of the discharge and exhaustion. She was much troubled at first by the formation of a large abscess in the iliac fossa; but after a time this subsided, and when she was sent to the sea-side, ninety days after the operation, the parts were all consolidating and there was every prospect of a sound limb.

Excisions of the knee were four in number; of these two were fatal and two were followed by very good results. One of the fatal cases occurred in a female, aged nineteen, in whom disease of the knee had existed for ten years. Death occurred suddenly on the morning of the eighth day; and at the post-mortem examination there was

found to be a plugging of the cerebral arteries and amyloid degeneration of the kidneys.

The other fatal case was that of a little girl, aged nine, in whom excision of the knee was performed whilst the disease was in an acute state. She died of exhaustion on the seventeenth day.

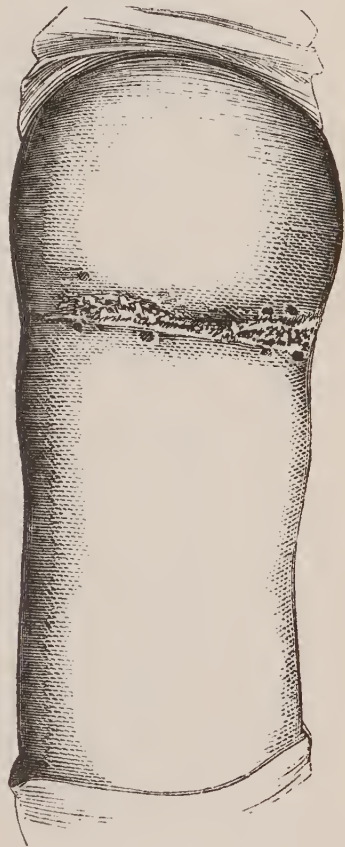
The two successful cases of excision of the knee both occurred in boys. In one, aged eleven, the disease of the knee had existed two years. After the operation he went on uninterruptedly well: on the fortieth day union had taken place, and the wound was healed, and on the fiftieth day he was running about the ward without support of any kind. There was about two inches shortening. The accompanying woodcut represents the state of the parts seven weeks after the operation.

The other case of excision of the knee was one which presented some points of peculiarity. The boy, aged thirteen, was admitted with acute periostitis of the lower end of the femur, followed by suppuration in the knee-joint and partial dislocation. As the necrosis which resulted in the femur was confined to quite the lower part, excision was determined upon and performed. At the operation two pieces of dead bone connected with the femur in the popliteal space were removed. The boy made a good recovery, and left the hospital in four months with a sound limb.

The excisions of the elbow-joint were four: three of these were for disease, and one primary for compound fracture into the elbow-joint. In this latter case traumatic gangrene attacked the wound, necessitating secondary amputation. The stump was again attacked with gangrene, and the case terminated fatally on the fifth day.

Of the remaining three cases two recovered with very useful limbs; in one there was the power of extension and flexion, supination and pronation; in the other this latter movement was very slight. In the fatal case death occurred from hæmorrhage, in consequence of sloughing extending into the profunda artery. The excision of the wrist was performed for disease of that articulation in a man aged fifty-five. The result was not entirely satisfactory, as some months after he had very little power in the limb; but it is to be noticed that he ran away from the hospital during the course of the treatment.

In the other nine cases of joint-disease necessitating operative interference, amputation was the operation resorted to. These, with



eight cases of amputation for other forms of disease, and eleven for injury, complete the list of amputations during the past year, being twenty-eight in number.

The following is a brief summary of these cases, of which thirteen proved fatal.

Of the thigh there were eleven cases, of which three died. Of these ten were performed for disease ; two were at the hip-joint ; one for disease of this articulation, and one for recurrent fibro-tumour ; seven were in the thigh, six for disease of knee-joint, and one for diffuse suppuration following phlebitis after delivery, and one was at the knee-joint for epithelioma of the leg. All the amputations in the thigh were circular except one, and in this an attempt had been first made to excise the knee ; but in consequence of the tibia being found to be too extensively diseased, it was converted into an amputation by cutting a large posterior flap from the calf of the leg. This case might perhaps be more properly styled an amputation at the knee-joint, except that the articular cartilage of the femur was removed.

In the other case of amputation at the knee the cartilage was not removed ; the operation was performed by a large anterior flap. The remaining case of thigh-amputation was secondary after compound fracture. There were three fatal cases, two of pyæmia, and the third of exhaustion on the fourth day.

The amputations of the leg were eight in number : three of these were secondary after compound fracture, and in one case both legs were removed. They all terminated fatally. The other five were for disease ; two cases of the tarsus : one epithelioma, and the other two disease of the ankle-joint ; of these latter cases two were fatal. Amputations of the arm were eight in number : two for disease—one of them at the shoulder-joint, for a large encephaloid tumour of the arm, terminated fatally from fatty disease of the heart ; the other for destruction of the skin, the result of diffuse cellulitis, recovered. The other six were for injury ; of these four died, two of traumatic gangrene, and two of pyæmia. One man recovered after primary amputation of the forearm.

CASES ADMITTED DURING THE YEAR 1865.

Nature of Injury.	Total Number of Admissions.	Total Number of Deaths.	Percentage of Mortality.	Complicated with other Injury.	Complicated with Disease.	Operations.
A. General injuries :						
<i>a.</i> Burns	28	13	46·4			
<i>b.</i> Scalds	30	5	16·6	3	1	1
B. Local injuries :						
1. Of the head :						
<i>a.</i> Scalp-wound (bone not exposed)	45	1	2·2	5	7	
<i>b.</i> Scalp-wound (bone exposed)	32	4	12·5	5	8	
<i>c.</i> Concussion	40	. .	. .	4		
<i>d.</i> Simple fracture	8	6	75	. .	. .	1
<i>e.</i> Compound fracture	10	5	50	1	1	1
<i>f.</i> Fracture of the base	12	4	33·3	1	1	
<i>g.</i> Contusions	4	. .	. .	. .	1	
2. Of the face :						
<i>a.</i> Fracture of the lower jaw	1					
<i>b.</i> " bones of face	2					
<i>c.</i> Contusion of face	16	. .	. .	2		
<i>d.</i> Wounds of the face	23	1	43·5	2	4	
<i>e.</i> " " eyelid	2					
<i>f.</i> " " eyeball	4					
3. Of the back :						
<i>a.</i> Fracture of spine	1	1	100	1		
<i>b.</i> Sprains and contusions	39	. .	. .	2	1	
<i>c.</i> Wounds	1					
<i>d.</i> Concussion	1					
4. Of the neck :						
<i>a.</i> Cut throats and wounds	7	1	14·3	. .	1	
<i>b.</i> Contusions and sprains	4					
<i>c.</i> Foreign bodies in pharynx	2					
5. Of the chest :						
<i>a.</i> Fractured rib	36	1	2·8	8	1	
<i>b.</i> Contusions	12	. .	. .	2		
<i>c.</i> Wounds of the chest-wall	5					
<i>d.</i> Fractured sternum	2					
<i>e.</i> Ruptured viscus	3	1	33·3	1		
6. Of the abdomen :						
<i>a.</i> Contusions	13					

Nature of Injury or Disease.	Total Number of Admissions.	Total Number of Deaths.	Percentage of Mortality.	Complicated with other Injury.	Complicated with Disease.	Operations.
B. Local injuries—<i>continued</i>.						
6. Of the abdomen :						
<i>b.</i> Injuries of the scrotum	7					
<i>c.</i> Ruptured viscera	7	4	57.1	1		
<i>d.</i> Fractured pelvis	1			1		
7. Of the upper extremity :						
<i>a.</i> Contusions	5			2		
<i>b.</i> Wounds :						
<i>a.</i> Above shoulder	2					
<i>β.</i> Of arm	4	1	25		1	
<i>γ.</i> „ forearm	12	1	83	1	4	
<i>δ.</i> „ hand	9			3	2	
<i>c.</i> Fractures :						
<i>a.</i> Clavicle	4			1		
<i>β.</i> Humerus	2					
<i>γ.</i> Forearm	3					
<i>δ.</i> Hand	2	1	50	1	1	
<i>d.</i> Compound fractures	15	4	26.6	2	3	9
<i>e.</i> Dislocations :						
<i>a.</i> Shoulder	5					
<i>β.</i> Elbow	2	1	50	2		
<i>γ.</i> Thumb	3			1	2	
<i>f.</i> Sprains	8			1		
<i>g.</i> Gunshot wounds	2				2	1
8. Of the lower extremity :						
<i>a.</i> Contusions	57	1	1.75	2	1	
<i>b.</i> Wounds :						
<i>a.</i> Of the thigh	19			1	2	
<i>β.</i> „ leg	20	1	5	2	9	
<i>γ.</i> „ foot	13				1	
<i>c.</i> Simple fractures :						
<i>a.</i> Of the femur	29	1	3.45	3		
<i>d.</i> „ cervix femoris	10	1	10			
<i>β.</i> „ tibia	7			1		
<i>γ.</i> „ fibula	13					
<i>δ.</i> „ patella	15	1	6.6		1	
<i>ε.</i> „ leg	60	3	5	4	3	2
<i>ζ.</i> „ foot	5					
<i>d.</i> Compound fractures	26	9	3.5	4	8	5
<i>e.</i> Dislocations :						
<i>a.</i> Of the ankle	1			1		
<i>f.</i> Sprains :						
<i>a.</i> Of the hip	22				1	
<i>β.</i> „ knee	43					
<i>γ.</i> „ ankle	78			2		
C. Diseases (general) :						
<i>a.</i> Erysipelas (cutaneous)	26	1	4	20	6	
<i>b.</i> „ (phlegmonous)	15	2	13.3	11	2	1
<i>c.</i> Gangrene	1					
<i>a.</i> Senile	2	1	50			
<i>β.</i> Hospital	51	5	10	13	30	10
<i>d.</i> Pyæmia	20	17	85	13	6	7

Nature of Disease.	Total Number of Admissions.	Total Number of Deaths.	Percentage of Mortality.	Complicated with other Injury.	Complicated with Disease.	Operations.
D. Diseases (local) :						
1. Diseases of the organs of motion :						
<i>a.</i> Of bone :						
<i>α.</i> Abscess in bone . . .	9	. .	. .	. .	2	3
<i>β.</i> Necrosis . . .	60	. .	. .	. .	11	11
<i>γ.</i> Caries . . .	25	1	4	. .	1	3
<i>δ.</i> Disease of spine . . .	39	2	5·1			
<i>ε.</i> Lateral curvature . . .	1					
<i>ζ.</i> Tumours of bone . . .	3	1	33·3	. . .	. .	3
<i>η.</i> Periostitis . . .	12	. .	. .	. . .	. .	1
<i>b.</i> Of joints :						
<i>α.</i> Synovitis . . .	48	. .	. .	. .	7	
<i>β.</i> Ulceration of cartilages . . .	10	. .	. .	. .	. .	3
<i>γ.</i> Abscess in joint . . .	19	5	26·3	. .	5	15
<i>δ.</i> Diseased ligaments . . .	3					
<i>ε.</i> Hysterical joint . . .	6					
<i>ζ.</i> Rheumatism . . .	7					
<i>η.</i> Ankylosis . . .	15					
<i>θ.</i> Morbus coxæ . . .	47	1	2·13	. .	2	2
<i>c.</i> Of bursæ :						
<i>α.</i> Inflamed bursa patellæ . . .	38	. .	. .	1	2	
<i>β.</i> Other bursa inflamed . . .	4					
<i>γ.</i> Bursal tumours . . .	1					
<i>d.</i> Of muscles, tendons, and their sheaths :						
<i>α.</i> Thecal abscess . . .	16	. .	. .	. .	3	
<i>β.</i> Contracted tendons . . .	23	. .	. .	. .	1	15
<i>γ.</i> Effusion in sheaths . . .	2					
2. Diseases of the organs of circulation :						
<i>a.</i> Of the heart . . .	2	1	50	1	1	
<i>b.</i> Of the arteries :						
<i>α.</i> Aneurism . . .	3	1	33·3	. .	1	2
<i>β.</i> Nævus . . .	1					
<i>γ.</i> Other vascular tumours . . .	1	. .	. .	. .	. .	1
<i>c.</i> <i>α.</i> Varicose veins . . .	29	. .	. .	. .	20	8
<i>β.</i> Phlebitis . . .	6	1	16·6	. .	3	1
<i>d.</i> <i>α.</i> Inflamed absorbents . . .	6	. .	. .	. .	3	
<i>β.</i> Suppurating glands . . .	26	. .	. .	. .	1	
<i>γ.</i> Tumours of glands . . .	2	1	50			
3. Diseases of the organs of respiration :						
<i>a.</i> Disease of the larynx . . .	1	. .	. .	. .	1	1
<i>b.</i> Bronchitis . . .	5	3	60	1	5	
<i>c.</i> Phthisis . . .	3	3	100	. .	3	
<i>d.</i> Pleurisy . . .	2	. .	. .	. .	1	
<i>e.</i> Pneumonia . . .	3	3	100	1	1	
4. Diseases of the nervous system :						
<i>a.</i> Of the brain :						
<i>α.</i> Epilepsy . . .	5	1	20	5		
<i>β.</i> Inflammation . . .	5	3	60	4		

Nature of Disease.	Total Number of Admissions.	Total Number of Deaths.	Percentage of Mortality.	Complicated with other Injury.	Complicated with Disease.	Operations.
D. Diseases (local)— <i>continued</i> .						
4. Diseases of the nervous system :						
<i>a.</i> Of the brain :						
<i>γ.</i> Delirium tremens .	7	4	57·1	6		
<i>δ.</i> Other organic changes .	3	1	33·3			
<i>ε.</i> Malformations . .	1	1	100			
<i>ζ.</i> Convulsions . . .	1					
<i>b.</i> Of the spinal cord :						
<i>α.</i> Paralysis infantum .	2	. .	. .	1	. .	1
<i>β.</i> Partial paralysis . .	6					
<i>γ.</i> Neuralgia	2					
<i>δ.</i> Inflammation . . .	1	1	100			
5. Diseases of the skin and its appendages :						
<i>a.</i> Eruptions :						
<i>α.</i> Eczema	31	1	3·2	. .	3	1
<i>β.</i> Herpes	1					
<i>γ.</i> Impetigo	1					
<i>δ.</i> Rupia	10	1	10	. .	1	
<i>ε.</i> Psoriasis	1					
<i>ζ.</i> Lepra	1					
<i>η.</i> Lichen	1					
<i>θ.</i> Lupus	5					
<i>ι.</i> Purpura	1	. .	. .	. .	2	
<i>κ.</i> Scabies	6	. .	. .	. .	1	
<i>λ.</i> Pemphigus	1					
<i>b.</i> Ulcer	153	4	2·7	. .	33	3
<i>c.</i> Superficial abscesses . .	64	3	4·7	. .	2	
<i>d.</i> Cancerous ulceration . .	10	3	30	. .	. .	9
<i>e.</i> Tumours :						
<i>α.</i> Fatty tumours . . .	6	. .	. .	. .	. .	6
<i>β.</i> Sebaceous tumours .	7	. .	. .	. .	1	6
<i>γ.</i> Other encysted „ .	3	. .	. .	. .	. .	1
<i>δ.</i> Malignant „ . . .	2	1	50	. .	. .	1
<i>ε.</i> Recurring „ . . .	3	. .	. .	. .	. .	3
<i>f.</i> Carbuncles	4					
<i>g.</i> Boils	5	. .	. .	. .	1	
<i>h.</i> Œdema	9	. .	. .	. .	1	
<i>i.</i> Contracted cicatrix . .	3					
<i>h.</i> Cancer of skin	2					
<i>l.</i> Onychia	5					
<i>m.</i> Corns and bunions . . .	3					
<i>n.</i> Elephantiasis	1					
6. Diseases of the eye, nose, and ear :						
<i>a.</i> Of the eye :						
<i>α.</i> Conjunctivitis . . .	7	. .	. .	. .	2	
<i>β.</i> Corneitis	17					
<i>γ.</i> Iritis	11	. .	. .	. .	3	
<i>δ.</i> Cataract	11	. .	. .	. .	1	5
<i>ε.</i> Amaurosis	6	. .	. .	. .	1	
<i>ζ.</i> Abscess in eyeball . .	3					
<i>η.</i> Granular lids	1					

Nature of Disease.	Total Number of Admissions.	Total Number of Deaths.	Percentage of Mortality.	Complicated with other Injury.	Complicated with Disease.	Operations.
D. Diseases (local)— <i>continued</i> .						
6. Diseases of the eye, nose, and ear :						
<i>a.</i> Of the eye :						
<i>θ.</i> Abscess in lacrymal sac	1					
<i>ι.</i> Tumour of eyelid	3					
<i>κ.</i> Entropion	3	. . . .	. . . .	. . . .	. . . .	1
<i>b.</i> Of the ear :						
<i>α.</i> Otorrhœa	1					
<i>c.</i> Of the nose :						
<i>α.</i> Polypus	3	. . . .	. . . .	. . . .	. . . .	1
<i>β.</i> Ozæna	2					
<i>γ.</i> Epistaxis	1					
7. Diseases of the organs of digestion :						
<i>a.</i> Of the mouth :						
<i>α.</i> Abscess of mouth	5					
<i>β.</i> Ulceration of mucous membrane	3	1	33·3			
<i>γ.</i> Sore-throat	1					
<i>δ.</i> Fissured palate	1	. . . .	. . . .	. . . .	. . . .	1
<i>ε.</i> Epulis	2	. . . .	. . . .	. . . .	. . . .	2
<i>ζ.</i> Hare-lip	6	. . . .	. . . .	. . . .	. . . .	5
<i>η.</i> Enlarged tonsils	1	. . . .	. . . .	. . . .	. . . .	1
<i>θ.</i> Cancer of lip	1	. . . .	. . . .	. . . .	. . . .	1
<i>ι.</i> „ tongue	2	1	50			
<i>κ.</i> Ranula	1					
<i>b.</i> Of the other organs of digestion :						
<i>α.</i> Strangulated hernia	30	5	16·6	. . . .	. . . .	16
<i>β.</i> Reducible „	4	. . . .	. . . .	. . . .	1	
<i>γ.</i> Irreducible „	6					
<i>δ.</i> Peritonitis	1	1	100	. . . .	1	
<i>ε.</i> Fæcal abscess	2	1	50	. . . .	1	
<i>ζ.</i> Ulceration of rectum	2					
<i>η.</i> Fistula	11	. . . .	. . . .	. . . .	. . . .	6
<i>θ.</i> Piles	13	. . . .	. . . .	. . . .	. . . .	3
<i>ι.</i> Stricture of rectum	5	2	40	. . . .	1	
<i>κ.</i> Prolapsus ani	2					
<i>λ.</i> Fissure of rectum	9					
<i>μ.</i> Abscess inside rectum	10	. . . .	. . . .	. . . .	. . . .	6
<i>ν.</i> Cancer of rectum	5	1	20	. . . .	1	
8. Diseases of the urinary organs :						
<i>a.</i> Of the kidneys :						
<i>α.</i> Albuminuria	3	1	25	. . . .	3	1
<i>β.</i> Stone in the kidneys	3					
<i>b.</i> Of the bladder :						
<i>α.</i> Ectopia vesicæ	1	. . . .	. . . .	. . . .	. . . .	1
<i>β.</i> Inflammation	1	1	100			
<i>γ.</i> Irritable bladder	7					
<i>δ.</i> Hæmaturia	5					
<i>ε.</i> Stone in the bladder	3	. . . .	. . . .	. . . .	. . . .	3
<i>ζ.</i> Strumous disease	1					

Nature of Disease.	Total Number of Admissions.	Total Number of Deaths.	Percentage of Mortality.	Complicated with other Injury.	Complicated with Disease.	Operations.
D. Diseases (local)— <i>continued</i> .						
8. Diseases of the urinary organs :						
<i>c</i> . Of the urethra :						
<i>a</i> . Vascular tumour of female urethra . . .	5					
<i>β</i> . Stricture . . .	34	1	3.1	1	2	2
<i>γ</i> . Fistula in perineo . .	13	2	15.4	. .	1	3
<i>δ</i> . Enlarged prostate . .	3	2	66.6	. .	. .	2
<i>ε</i> . Effusion of urine . .	4	. .	. .	. .	. .	2
9. Of the male generative organs :						
<i>a</i> . Syphilis . . .	14	. .	. .	. .	4	
<i>a'</i> . Secondary syphilis . . .	22	. .	. .	. .	5	
<i>b</i> . Gonorrhœa . . .	9	. .	. .	. .	8	
<i>c</i> . Warts . . .	2	. .	. .	. .	. .
<i>d</i> . Phimosis . . .	2	. .	. .	. .	1	1
<i>e</i> . Hydrocele . . .	8	1	12.5	. .	. .	6
<i>f</i> . Varicocele . . .	7	. .	. .	. .	. .	7
<i>g</i> . Neuralgia testis . . .	1	. .	. .	. .	. .
<i>h</i> . Acute orchitis . . .	12	. .	. .	. .	1	
<i>i</i> . Chronic „ . . .	2	. .	. .	. .	. .
<i>k</i> . Cancer of penis . . .	3	. .	. .	. .	. .	3
<i>l</i> . Disease of breast . . .	1	1	100	. .	. .	1
10. Diseases of the female organs of generation :						
<i>a</i> . Of the breast :						
<i>a</i> . Abscess . . .	4					
<i>β</i> . Milk-abscess . . .	3					
<i>γ</i> . Chronic mammary tumour . . .	1	. .	. .	. .	. .	1
<i>δ</i> . Cystic tumour . . .	1	. .	. .	. .	. .	1
<i>ε</i> . Sero-cystic tumour . .	2	. .	. .	. .	. .	2
<i>ζ</i> . Scirrhus . . .	7	. .	. .	. .	. .	4
<i>b</i> . Of the other organs :						
<i>a</i> . Abscess of labium . .	4					
<i>γ</i> . Malignant disease of labium . . .	2	. .	. .	. .	. .	2
<i>δ</i> . Gonorrhœa . . .	7	. .	. .	. .	1	
<i>ε</i> . Condyloma . . .	4	1	25	. .	1	1
<i>ζ</i> . Syphilis . . .	4					
<i>η</i> . Secondary syphilis . .	9	. .	. .	. .	3	
<i>θ</i> . Leucorrhœa . . .	1	. .	. .	. .	1	
<i>ι</i> . Vesico-vaginal fistula . .	1					
<i>κ</i> . Prolapsus uteri . . .	2					
<i>λ</i> . Fibrous tumour of uterus .	1	1	100	. .	. .	1
<i>μ</i> . Inflammation of uterus .	1					
<i>ν</i> . Ovarian tumour . . .	5	1	20	. .	. .	2
<i>ο</i> . Laceration of perineum .	4	. .	. .	. .	1	1
<i>π</i> . Hysteria . . .	15	. .	. .	. .	2	
11. Diseases of blood-glands :						
<i>a</i> . Goitre . . .	1					

TABULAR STATEMENT OF OPERATIONS PERFORMED DURING 1865.

CLASS I. <i>Operations on the Head, Neck, and Face.</i>							
No.	Name.	Age.	Sex.	Nature of disease.	Nature of operation.	Result, and at what date.	Remarks.
1.	John W.	25	M.	Simple depressed fracture of skull, with symptoms of compression.	Trephining.	Died, 2d day.	After death the brain was found to be bruised.
2.	Thomas W.	34	M.	Comp ^d depressed fracture, with brain-symptoms.	Trephining.	Died, 15th day.	He died of pyæmia.
3.	Richard E.	14	M.	Naso-pharyngeal polypus.	Removed through the nose by means of forceps.	Recovered.	The disease had already been removed eight times.
4.	John B.	65	M.	Cancer (epithelioma) of lip.	Removed by semi-lunar incision.	Recovered.	The patient had a slight attack of phagedæna after the operation.
5.	A. B.	14	F.	Fissure of soft palate.	Staphyloraphy.	Recovered, 9 days.	
6.	Robert G.	1½	M.	Œdemaglottidis from scald.	Laryngotomy.	Died.	
7.	J. T.	37	M.	Laryngitis.	Tracheotomy.	Died.	
8.	James R.	37	M.	Cystic tumour of jaw.	Removal of tumour and portion of jaw from which it sprung.	Recovered.	Death occurred from pneumonia.

In this class are also six cases for the cure of hare-lip; two for the removal of epulis; one, removal of enlarged tonsil; one, fatty tumour of neck; three, sebaceous tumour of scalp; one, sebaceous tumour of neck.

CLASS II. <i>Operations on the Upper Extremity.</i>							
No.	Name.	Age.	Sex.	Nature of disease.	Nature of operation.	Result, and at what date.	Remarks.
1.	Jane L.	59	F.	Malignant tumour of arm.	Amputation of shoulder-joint by double flap.	Died, 3d day.	She died of fatty heart.
2.	George D.	23	M.	Compound fraeture of arm, severe laceration of soft parts.	Primary amputation by double flap.	Died, 36 days.	He died of pyæmia.
3.	Maria M.	24	F.	Compound dislocation of elbow, diffuse cellular inflammation.	Secondary amputation by double flap.	Died, 38 days.	She died of pyæmia.
4.	George W.	62	M.	Diffuse cellular inflammation, extensive destruction of skin.	Amputation by circular incision.	Reeovered, 44 days.	
5.	Eliza A.	57	F.	Compound fraeture of arm, extensive laceration of soft parts.	Amputation by circular incision.	Recovered, 48 days.	This patient had also extensive fraeture of ribs.
6.	John B.	30	M.	Compound fraeture of arm, extensive comminution of bone.	Amputation (primary, by double flap).	Died, 19 days.	This man had also fraetured leg and scalp-wound.
7.	Edward F.	32	M.	Compound fraeture of arm and dislocation of elbow.	Secondary amputation by circular incision.	Died, 5 days.	Death from traumatic gangrene. Excision had first been performed. See No. 10.
8.	William S.	19	M.	Compound fracture into elbow-joint.	Primary amputation by circular method.	Reeovered, 40 days.	
9.	Edward T.	16	M.	Compound comminuted fracture of forearm.	Primary amputation by double flap.	Recovered, 20 days.	
10.	Edward F.	32	M.	Compound fracture and dislocation of elbow.	Primary excision of the elbow-joint.	Died.	Traumatic gangrene followed the operation, for which amputation was performed. See No. 7.

11.	Walter W.	29	M.	Abscess through elbow-joint.	Excision by longitudinal incision.	Recovered.	When discharged, he could flex his forearm and rotate it.
12.	Thomas A.	36	M.	Enlargement of ends of bone, ankylosed joint, abscess (elbow).	Excision by longitudinal incision.	Died, 6 days.	Death took place from sloughing into the profunda artery.
13.	Henry H.	32	M.	Abscess in joint (elbow) following inflammation of bursa over olecranon.	Excision.	Recovered, 48 days.	When discharged he could flex and extend his arm. There was very little power of rotation.
14.	John H.	55	M.	Total destruction of wrist-joint.	Excision of wrist by transverse incision on dorsum.	Irregular; the man left the hospital without permission.	The man was seen afterwards. The result was not very good. There was very little power.
15.	Charlotte P.	19	F.	Malignant tumour connected with the scapula.	Excision of the whole scapula except the acromion process.	Recovered, 3 weeks.	The disease recurred eight months afterwards.

In this class are also two cases of partial amputation of the hand; four of removal of dead bone; four of removal of fatty tumours; and three of cystic tumours.

CLASS III. *Operations on the Thorax.*

1.	Mary Ann L.	40	F.	Scirrhus tumour of breast.	Amputation of breast.	Recovered, 24 days.	The disease returned in the cicatrix.
2.	Margaret M.	30	F.	Scirrhus tumour of breast.	Amputation of breast.	Relieved, 6 months.	Before the wound healed the disease returned, and was removed. It again returned, and was again removed. A solution of chloride of zinc was applied to the wound at the second operation.
3.	Laura A.	32	F.	Scirrhus tumour of breast.	Amputation of breast.	Recovered, 41 days.	

No.	Name.	Age.	Sex.	Nature of disease.	Nature of operation.	Result, and at what date.	Remarks.
4.	Mary A.	54	F.	Scirrhus tumour of breast.	Amputation of breast.	Recovered, 30 days.	
5.	Emma C.	29	F.	Sero-cystic tumour of breast.	Amputation of breast.	Recovered, 29 days.	
6.	Mary R.	38	F.	Sero-cystic tumour of breast.	Amputation of breast.	Recovered, 23 days.	
7.	Bertha B.	30	F.	Chronic mammary tumour.	Removal of tumour.	Recovered, 17 days.	
8.	Susan S.	36	F.	Fatty tumour of breast.	Removal of tumour.	Recovered, 14 days.	
9.	Frederick C.	40	M.	Cystic tumour of breast.	Removal of tumour.	Died, 18 days.	
CLASS IV. <i>Operations on the Abdomen.</i>							
1.	Elizabeth H.	72	F.	Strangulated femoral hernia; ruptured 7 years; strangulated 32 hours.	Sac opened; contained healthy gut and adherent omentum.	Recovered, 24 days.	She had been operated on twice before.
2.	Ann C.	55	F.	Strangulated femoral hernia; ruptured 12 years; strangulated 36 hours.	Sac opened; contained congested gut and some bloody fluid.	Died, 15 hours.	Taxis had been violently applied prior to admission. She was collapsed before the operation, and never rallied. He had a sharp attack of secondary hæmorrhage after the operation.
3.	James P.	53	M.	Strangulated inguinal hernia; ruptured 2 years; strangulated 3 days.	Sac not opened.	Recovered, 36 days.	He had been operated on once before. He died of peritonitis.
4.	John P.	59	M.	Strangulated femoral hernia; ruptured 7 years; strangulated 2 days.	Sac opened; contained some flakes of lymph and congested and thickened gut.	Died, 3 days.	

5.	Henry D.	20	M.	Strangulated inguinal hernia; ruptured 3 months: strangulated 8 hours.	Sac opened; contained healthy gut and omentum.	Recovered, 47 days.	Recovery was retarded by suppuration of the cellular tissue of the scrotum.
6.	John B.	20	M.	Strangulated inguinal hernia; ruptured 3 years: strangulated 29 hours.	Sac opened; contained about ten inches of healthy gut.	Recovered, 67 days.	
7.	Sarah V.	70	F.	Strangulated femoral hernia; ruptured 3 months: strangulated 12 hours.	Sac opened; contained healthy gut and turbid serum.	Recovered, 26 days.	
8.	John S.	30	M.	Strangulated inguinal hernia; ruptured many years: strangulated 26 hours.	Sac opened; contained nothing but adherent omentum.	Recovered, 33 days.	The omentum was tied and removed at the operation.
9.	Jane E.	57	F.	Strangulated femoral hernia; ruptured 13 years: strangulated 20 hours.	Sac opened; contained bloody fluid and gangrenous gut.	Died, 19 hours.	Taxis had been violently applied six times. When the operation was performed she was sinking. The gut was opened and stitched to the edges of the wound.
10.	Charlotte H.	54	F.	Strangulated femoral hernia; ruptured 6 months: strangulated 24 hours.	Sac opened; contained a small knuckle of dark gut; no fluid.	Recovered, 29 days.	
11.	Charlotte S.	40	F.	Strangulated femoral hernia; ruptured 2 months: strangulated 24 hours.	Sac opened; contained bloody fluid, omentum, and about a foot of perfectly black gut.	Died, 6 days.	The symptoms were very urgent. At the operation the stricture was very tight. She died of peritonitis.
12.	Elizabeth P.	55	F.	Strangulated umbilical hernia; ruptured 10 years: strangulated 36 hours.	Sac opened; contained some healthy gut and bruised omentum.	Recovered, 46 days.	The omentum was ligatured and cut off.
13.	Thomas M.	43	M.	Strangulated femoral hernia; ruptured 10 years: strangulated 48 hours.	Sac opened; contained a quantity of turbid serum and a knuckle of congested gut.	Recovered, 34 days.	

No.	Name.	Age.	Sex.	Nature of disease.	Nature of operation.	Result, and at what date.	Remarks.
14.	Ann B.	45	F.	Strangulated femoral hernia; ruptured 3 years; strangulated 12 hours.	Sac opened; contained flakes of lymph and bruised intestine.	Recovered, 98 days.	Recovery was retarded by suppuration in and around the sac.
15.	James A.	60	M.	Strangulated femoral hernia; ruptured 15 years; strangulated 18 hours.	Sac opened; contained healthy gut and adherent omentum.	Died, 13 days.	The omentum was removed. He died from exhaustion from profuse suppuration in the sac.
16.	Mary-Anne W.	75	F.	Strangulated femoral hernia; ruptured 12 months; strangulated 18 hours.	Sac opened; contained dark serum and deeply congested gut, with a patch of ulceration on it.	Recovered, 20 days.	
17.	Lucy G.	54	F.	Obstruction of bowels from malignant stricture of rectum.	Amussat's operation.	Died, 3 days.	* She died of peritonitis. The incision had wounded the peritoneum.
18.	Charlotte W.	.	F.	Recurrent fibroid tumour of abdominal wall.	Removal of tumour.	Recovered.	This tumour presented all the microscopical appearances of true recurrent fibroid tumour.

In this class there were also sixteen operations for the cure of fistula in ano and fissure of the rectum, and twelve for the cure of piles.

CLASS V. *Operations on the Genito-urinary Organs.*

1.	John C.	27	M.	Congenital extroversion of the bladder.	Plastic operation by two lateral flaps.	Relieved.	Portion of the flaps sloughed. There was, however, a narrow bridge left.
2.	George G.	28	M.	Impermeable stricture of urethra.	Tapping bladder per rectum.	Recovered, 20 days.	
3.	Daniel K.	30	M.	Impermeable stricture of urethra.	Tapping bladder per rectum.	Recovered, 32 days.	
4.	Stephen S.	26	M.	Impermeable stricture of urethra and urinary fistula.	Perineal section.	Recovered, 80 days.	
5.	Joseph E.	52	M.	Impermeable stricture of urethra and urinary fistula.	Perineal section.	Recovered, 5 months.	
6.	John C.	29	M.	Urethral fistula.	Plastic operation; paring the edges and bringing them together with silver suture.	Relieved, 19 days.	When discharged, there was still a minute opening through which a drop of urine at times escaped.
7.	Sarah H.	35	F.	Ruptured perineum.	Plastic operation; parts brought together with quilled sutures.	Recovered, 4 months.	The case was operated on because she suffered from prolapsus uteri, and was unable to retain a pessary.
8.	Godfrey T.	9	M.	Stone in the bladder.	Lithotomy.	Recovered, 11 days.	
9.	William R.	42	M.	Stone in the bladder.	Lithotomy.	Recovered, 36 days.	
10.	James S.	4	M.	Stone in the bladder.	Lithotomy.	Recovered, 20 days.	
11.	George P.	59	M.	Epithelioma of penis.	Amputation of penis.	Recovered, 28 days.	Operation was performed with a knife, the écraseur having broken at the beginning of the operation.

No.	Name.	Age.	Sex.	Nature of disease.	Nature of operation.	Result, and at what date.	Remarks.
12.	James B.	58	M.	Epithelioma of penis.	Amputation of penis.	Recovered, 26 days.	The operation was performed with the écraseur. The operation was performed with a knife.
13.	Thomas D.	38	M.	Epithelioma of penis.	Amputation of penis.	Recovered, 39 days.	
14.	Jane H.	64	F.	Epithelioma of labia.	Diseased mass dissected out.	Recovered, 30 days.	
15.	Hannah W.	74	F.	Epithelioma of labia.	Diseased mass dissected out.	Recovered, 47 days.	
16.	Charlotte S.	25	F.	Ovarian tumour.	Ovariectomy.	Recovered, 38 days.	
17.	Emily C.	38	F.	Ovarian tumour.	Ovariectomy.	Died, 36 hours.	
18.	Margaret S.	29	F.	Fibrous tumour of the uterus.	Removal of tumour.	Died, 4 hours.	
This class also includes six cases of the radical cure of hydrocele and seven of varicocele.							
CLASS VI. <i>Operations on the Lower Extremity.</i>							
1.	Ann A.	35	F.	Recurrent fibroid tumour at back of thigh.	Amputation at the hip-joint.	Recovered, 31 days.	The disease had previously been removed twice, and recurred. After her discharge she remained well for some time, but was re-admitted in 1866 with a recurrence of the disease in the viscera of the abdomen, and died.

2.	Charles B.	13	M.	Disease of hip, abscess in joint, and extending into pelvis through acetabulum.	Amputation at hip-joint by a longitudinal incision over trochanter, and circular round the thigh, joining the extremity of the first incision.	Recovered, 61 days.	This boy had had disease of hip many years. He was sinking from excessive discharge.
3.	John W.	23	M.	Disease of knee; ulceration of cartilages; abscess in joint.	Amputation of thigh by circular incision.	Died.	He died of pyæmia.
4.	Richard W.	23	M.	Osteo-myelitis after compound fracture.	Amputation of thigh by circular method.	Recovered, 35 days.	
5.	John H.	52	M.	Ulceration of cartilages of knee-joint.	Amputation of thigh by circular method.	Recovered, 86 days.	There was some sloughing of the flaps after the operation.
6.	Septimus T.	40	M.	Strumous disease of knee-joint.	Amputation of thigh by circular method.	Recovered, 62 days.	
7.	James S.	12	M.	Strumous disease of knee-joint.	Amputation of thigh by large posterior flap.	Recovered, 34 days.	An attempt was made to excise in this case first; but the tibia was found to be too much diseased.
8.	Nathan M.	26	M.	Total destruction of knee-joint; abscess in joint.	Amputation of thigh by circular method.	Recovered, 48 days.	
9.	Victoria H.	23	F.	Diffuse cellular inflammation after delivery.	Amputation of thigh by circular method.	Died, 8 days.	She died of pyæmia.
10.	Arthur C.	5	M.	Disease of knee-joint; large abscess in thigh.	Amputation of thigh by circular method.	Recovered, 48 days.	
11.	Susan N.	17	F.	Ulceration of cartilages of knee-joint.	Amputation of thigh by circular method.	Died 5 months.	She sank and died of exhaustion consequent on formation of abscesses.
12.	Mary G.	55	F.	Epithelioma of leg.	Amputation through the knee-joint by long anterior and short posterior flaps.	Died, 3 days.	This woman also suffered from mania. She never rallied after the operation.

No.	Name.	Age.	Sex.	Nature of disease.	Nature of operation.	Result, and at what date.	Remarks.
13.	Michael L.	54	M.	Epithelioma of leg.	Amputation of leg by large posterior rectangular flap (modified Teale).	Recovered.	
14.	John W.	51	M.	Caries of tarsus; disease of ankle-joint.	Amputation of leg (modified Teale).	Died, 27 days.	He had extensive sloughing, followed by secondary hæmorrhage, after the operation; and he died of exhaustion. Recovery was retarded by a severe attack of phagedæna.
15.	Caroline R.	19	F.	Strumous disease of tarsus.	Amputation of leg (modified Teale).	Recovered, 6 months.	
16.	Thomas H.	31	M.	Abscess in end of tibia opening into ankle-joint.	Amputation of leg (modified Teale).	Recovered, 51 days.	
17.	George C.	21	M.	Compound comminuted fracture, followed by secondary hæmorrhage.	Amputation of leg (modified Teale).	Died, 9 days.	He died of pyæmia.
18.	Francis H.	49	M.	Fracture of both legs, followed by extensive sloughing.	Amputation of both legs by double flap.	Died, 12 days.	He died of exhaustion.
19.	William R.	46	M.	Compound comminuted fracture.	Secondary amputation of leg (modified Teale).	Died, 22 days.	
20.	Henry C.	14	M.	Disease of hip; abscess in joint.	Excision of hip by longitudinal incision.	Recovered, 70 days.	He could walk on it a short distance and raise it from the bed.
21.	Esther W.	7	F.	Disease of hip; extensive abscesses.	Excision of hip by longitudinal incision.	Recovered, 90 days.	She was sent to the sea-side with every prospect of a useful limb.

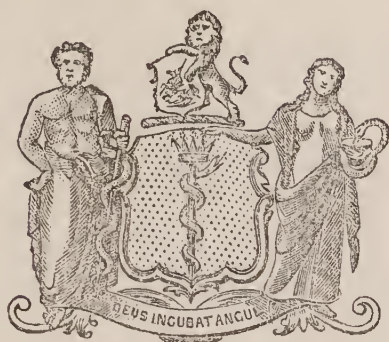
22.	Emma D.	19	F.	Abscess in knee-joint.	Excision by semilunar incision.	Died, 8 days.	At the post-mortem there were plugs in the cerebral arteries and amyloid degeneration of kidneys. She died of exhaustion.
23.	Fanny O.	9	F.	Acute disease of knee.	Excision by semilunar incision.	Died, 17 days.	
24.	Charles N.	11	M.	Strumous disease of knee.	Excision by semilunar incision.	Recovered, 50 days.	There was about two inches shortening.
25.	Henry W.	13	M.	Periostitis of lower end of femur; abscess in knee-joint.	Excision by semilunar incision.	Recovered, 4 months.	
26.	William B.	29	M.	Encephaloid disease of lower end of femur.	Ligature of femoral artery.	Died, 20 days.	He died of pyæmia.
27.	George H.	51	M.	Aneurism of femoral in groin.	Ligature of external iliac artery with silver wire.	Died, 3 days.	He died of bronchitis.
28.	John W.	43	M.	Popliteal aneurism.	Ligature of femoral at the apex of Scarpa's triangle.	Recovered, 30 days.	
29.	Edward B.	69	M.	Epithelioma of leg.	Removal by two semilunar incisions.	Recovered, 39 days.	
30.	Elizabeth S.	70	F.	Epithelioma of leg.	Removal by two semilunar incisions.	Recovered, 60 days.	The disease afterwards recurred in the glands of the groin. She was re-admitted, and died in the house.
31.	Ann A.	35	F.	Recurrent fibroid tumour of thigh.	Removal.	Disease returned.	The disease returned, and amputation was performed at the hip. Vide No. I.

This class also includes the removal of two sebaceous tumours and one fatty tumour; sixteen of necrosed bone, and four of laying open cavities in bone; nine cases of the radical cure of varicose veins by subcutaneous section; and sixteen of tenotomy.

THOMAS P. PICK.

ST. GEORGE'S HOSPITAL

Medical



School.

Session 1866-67.

THE WINTER COURSE OF INSTRUCTION WILL COMMENCE ON MONDAY,
OCTOBER FIRST,

*With an Introductory Address by DR. JOHN W. OGLE,
at 2 P.M., at the Hospital.*

Consulting Physician.
DR. PITMAN.

Physicians.
DR. PAGE; DR. FULLER; DR. BARCLAY; DR. JOHN W. OGLE.

Assistant-Physicians.
DR. WADHAM; DR. DICKINSON.

Consulting Surgeons.
MR. CÆSAR HAWKINS, F.R.S.; MR. CUTLER.

Surgeons.
MR. TATUM; MR. PRESCOTT HEWETT; MR. POLLOCK; MR. HEN. LEE.

Assistant-Surgeons.
MR. HOLMES; MR. BRODHURST.

Dentist.
MR. VASEY.

I.

Gentlemen may become PERPETUAL PUPILS by paying a compounding fee of One Hundred Pounds. Perpetual Pupils are entitled to admission to the practice of the Physicians and Surgeons, to all the Lectures (except Practical Chymistry), to compete for all Prizes and Exhibitions, to hold the appointments of House-Physician, House-

Surgeon, and Assistant House-Surgeon, and to become Clinical Clerks for two periods of three months each, and Dressers for two similar periods. This payment must in all cases be made at the time of entry.

II.

Gentlemen will be admitted to the Hospital Practice and Lectures required for the License of the Royal College of Physicians, for the Diploma of Member of the Royal College of Surgeons, and for the License of the Society of Apothecaries, with the exception of Practical Chymistry, on payment of the following fees, viz. Forty Pounds for the First Year of Study, Forty Pounds for the Second Year of Study, and Ten Pounds for each Succeeding Year. By payment of these fees, a Pupil is entitled to hold the offices of Clinical Clerk and Dresser for three months each, but not to become House-Physician or House-Surgeon, or to compete for the "William Brown Exhibition" and the "Clinical" Prizes. Pupils who have entered under this rule may at any time become Perpetual by making up their total payments to One Hundred and Ten Pounds.

III.

Gentlemen will be admitted to the Lectures and Hospital Practice required for the Diploma in Dental Surgery by one payment of Forty-five Pounds. This sum does not include Practical Chymistry.

IV.

Gentlemen may enter to the Hospital Practice and Lectures separately, on the following terms, viz. :

Hospital Practice—Physicians.

For the Period required to qualify for Examination for the License of the Royal College of Physicians, for the Diploma of Member of the Royal College of Surgeons, and the License of the Society of Apothecaries	}	Sixteen Guineas.
For Six Months		Eight Guineas.
For One Year		Sixteen Guineas.
Perpetual Pupils		Twenty-four Guineas.

Hospital Practice—Surgeons.

For the Period required to qualify for Examination for the License of the Royal College of Physicians, and the Diploma of Member of the Royal College of Surgeons	}	Twenty Guineas.
For Six Months		Fifteen Guineas.
For One Year		Twenty Guineas.
For each additional Year		Ten Guineas.
Perpetual Pupils		Forty Guineas.

Attendance of the Physicians and Surgeons daily at One o'clock.
Surgical Operations on Thursdays at One o'clock.

LECTURES.

	WINTER SESSION.	One Course.			Perpetual.		
		£	s.	d.	£	s.	d.
Descriptive and Surgical Anatomy		6	6	0	8	8	0
Physiology and General Anatomy		6	6	0	8	8	0
Chymistry		6	6	0	8	8	0
Medicine		6	6	0	6	6	0
Surgery		4	4	0	6	6	0
SUMMER SESSION.							
Materia Medica		4	4	0	5	5	0
Midwifery		5	5	0	6	6	0
Botany		3	3	0	4	4	0
Medical Jurisprudence		4	4	0	5	5	0
Practical Chymistry (including the use of apparatus and materials)		4	4	0			

House Physician. This Officer is appointed annually, on the recommendation of the Medical School Committee, from among the Physicians' Perpetual Pupils. He has charge of half the patients in the Medical Wards in the absence of the Physicians, and pays Fifty Pounds to the Treasurers of the Hospital for Board and Residence.

House Surgeons. The appointment to these offices is made half-yearly, on the nomination of the Medical School Committee, from among the Surgeons' Perpetual Pupils. The Pupil selected for this appointment assists the Curator for Six Months, and acts as Assistant House-Surgeon for a second period of Six Months, before his admission to the office of House-Surgeon, which he is entitled to hold for Twelve Months, on payment of Fifty Pounds to the Treasurers of the Hospital for Board and Residence.

Clinical Assistants. Every Pupil entering to the Medical Practice must hold the office of Clinical Assistant to one of the Physicians for a period of at least Three Months. Every Pupil entering to the Surgical Practice must hold the office of Clinical Assistant to one of the Surgeons for a similar period.

Dressers. Every Pupil entering to the Surgical Practice must hold the office of Dresser for a period of Three Months; but Perpetual Pupils have the privilege of holding the office for a second period of Three Months. The Dresser of the Surgeon of the week boards at the Hospital free of expense.

A Maternity Department, for the delivery of married lying-in women at their own homes, is established at the Hospital; and a Ward is devoted to the reception of women suffering under diseases peculiar to the sex, under the superintendence of the Obstetric Physician.

Obstetric Assistant. This officer is appointed annually by the Weekly Board from among the Senior Pupils, and is eligible for re-appointment. He resides and boards in the Hospital, receives a yearly salary of One Hundred Pounds, and must be a legally qualified practitioner.

Vaccination will be performed every Thursday morning at ten o'clock, and instruction in Vaccination given by the Obstetric Assistant.

Dental Surgery. Mr. Vasey will deliver a Course of Lectures on Dental Surgery during the Summer Session. Fee to Pupils (not being Pupils of the Hospital), One Guinea.

The ~~Library~~ and ~~Reading-Room~~ are open during the greater part of the day. Every Pupil of the Hospital has to subscribe the sum of Ten Shillings and Sixpence to the Library at the commencement of each Winter Session.

The ~~Museum~~ is open daily to the Pupils of the Hospital.

Curator. A Curator of the Pathological Museum is appointed annually by the Weekly Board from among the Senior Pupils, on the recommendation of the Medical School Council, with a Salary of Fifty Pounds per annum.

Registrars. A Medical and a Surgical Registrar are appointed annually by the Weekly Board from among the Senior Pupils, on the recommendation of the Medical School Council, each with a Salary of Fifty Pounds per annum.

REGULATIONS RESPECTING STUDENTS.

THE ATTENTION OF STUDENTS IS PARTICULARLY CALLED TO THE FOLLOWING REGULATIONS.

1. The Physicians' Perpetual Pupils are alone eligible for the office of House-Physician.
2. The Surgeons' Perpetual Pupils are alone eligible for the office of House-Surgeon.
3. All Pupils of the Hospital may become Candidates for the several offices of Medical and Surgical Registrar, Obstetric Assistant, and Curator of the Museum. They are also entitled to attendance on the Maternity Department, and the practice of Ophthalmic and Dental Surgery, without additional fee.
4. Certificates of Attendance on the Medical Practice will not be signed for any Pupil who has not held the office of Clinical Assistant to one of the Physicians.
5. Certificates of attendance on the Surgical Practice will not be signed for any Pupil who has not held the several offices of Clinical Assistant and Dresser to one or more of the Surgeons.
6. Certificates of attendance on Lectures will not be signed for any Pupil who does not attend regularly and conduct himself with propriety.
7. At the beginning of every Session each student must apply to Dr. BARCLAY, the Treasurer of the Medical School, for the

Tickets required. The tickets—before they can be registered—must be taken to the respective Lecturers for their signatures.

8. The schedules, as soon as procured from the College and Hall, should be brought to Dr. BARCLAY, in order that they may be filled up in due course and signed by the respective Teachers. Students ought to apply to him for the certificates of their past Courses of Lectures before entering on a new Session.

Attendance of Physicians and Surgeons at the Hospital.

Monday and Friday at 1 P.M.	{ Dr. PAGE and Dr. BARCLAY. Mr. TATUM and Mr. HEWETT.
Tuesday and Saturday at 1 P.M.	{ Dr. FULLER and Dr. OGLE. Mr. POLLOCK and Mr. HENRY LEE.

Out-Patients are seen on

Monday and Friday at 12 P.M., by Dr. DICKINSON and Mr. HOLMES.
Tuesday and Saturday „ „ Dr. WADHAM and Mr. BRODHURST.

DENTIST.

Mr. VASEY attends at the Hospital on Tuesday and Saturday at 9 A.M.,
and on Thursday at 1 P.M.

*** *Further information may be obtained from Dr. Barclay, the Treasurer of the School, from any of the Lecturers, or Medical Officers of the Hospital.*

EXHIBITIONS AND PRIZES.

“The William Brown Exhibition”

Of Forty Pounds per Annum, tenable for Three Years.

This Exhibition was founded by the Widow of William Brown, Esq., formerly a Pupil of St. George's Hospital, to be competed for by Perpetual Pupils who have commenced their third but not completed their fourth Winter Session. It will be “bestowed on the Candidate who shall show the best general fitness for the exercise of the Medical Profession, and whose moral conduct shall in all respects be satisfactory.”

Sir Charles Clarke's Prize for Good Conduct.

Sir Charles Clarke, Bart., M.D., formerly a Pupil of St. George's Hospital, left the sum of 200*l.* Consols, the interest of which was to be awarded annually to the Student of the Hospital “who, by reason of his general good conduct during the preceding year, should be considered the most deserving.”

This Prize will be awarded by the Medical School Committee at the end of the Summer Session.

The Thompson Medal.

Mr. Sergeant Thompson, who was for many years Treasurer of St. George's Hospital, invested the sum of 100*l.* Three per Cent Stock, in the names of Trustees, for the purchase of a Silver Medal annually, to be awarded for the best Clinical Report of Medical and Surgical Cases observed in the Hospital during the preceding twelve months. The cases are to be accompanied by observations, and are not to exceed twenty in each department.

Sir Benjamin Brodie's Clinical Prize in Surgery

Will be awarded to the Perpetual Pupil of the Hospital who shall have delivered to the Surgeons the best Report of not more than twenty Surgical cases which have occurred in the Hospital during the preceding twelve months, each case being accompanied with notes illustrative of its pathology, diagnosis, and treatment.

The Lewis Powell Clinical Prize in Medicine

Will be awarded to the Perpetual Pupil of the Hospital who shall produce the best Report of not more than twenty Medical cases which have occurred in the Hospital during the preceding twelve months. Each case to be accompanied by observations.

Competitors for the THOMPSON MEDAL and the CLINICAL PRIZES must send their Reports to the Secretary of the Medical School Committee on or before the 30th of June. The Reports must not have the name of the Candidate affixed, but must bear a motto on the outside, and be accompanied by a sealed envelope bearing the same motto, and containing his name and address.

The Henry Charles Johnson Memorial Prize in Anatomy

Will be awarded to that Pupil who shall, in the judgment of the Medical School Committee, exhibit the greatest proficiency in PRACTICAL ANATOMY.

The Examination for this Prize will be held at the close of the Winter Session.

General Proficiency Prizes.

At the close of the Summer Session a General Examination of all the Pupils will be held, when a CERTIFICATE OF PROFICIENCY will be given to each one who passes to the satisfaction of the Examiners, and the following PRIZES awarded to the most distinguished, viz.

TO PUPILS IN THEIR FIRST YEAR, TEN GUINEAS.

The subjects of Examination for the first year will be Anatomy, Physiology, Chymistry, and Botany.

TO PUPILS IN THEIR SECOND YEAR, TEN GUINEAS.

The subjects of Examination for the second year will be Anatomy, Physiology, Chymistry, and Materia Medica.

TO PUPILS IN THEIR THIRD YEAR, TEN GUINEAS.

The subjects of Examination for the third year will be Principles and Practice of Medicine and Surgery, Pathology, and Midwifery.

The Names of those Students who pass the above Examinations will be published in Alphabetical Order.

LECTURES.

The Winter Session commences October 1, and terminates March 31. The Summer Session commences May 1, and terminates July 31.

Descriptive and Surgical Anatomy.

BY MR. HOLMES AND MR. ROUSE.

In these Lectures, the numerous parts and organs of which the Human Body consists are described with reference to their form and mutual relations, especially in their connection with Surgery. Recent Dissections, Drawings, and Preparations are made use of for the purpose of illustration.

Physiology and General Anatomy.

BY DR. WILLIAM OGLE.

The structure and properties of the different tissues common to several organs are minutely described in this Course, as also the functions performed by those organs, either separately, or combined for a common purpose, and the laws which govern their actions.

These Lectures are illustrated by recent Dissections and Anatomical Preparations, and by Experiments and Diagrams.

Practical Anatomy.

Mr. Pick will give a course of demonstrations on Osteology. The Students will be assisted in the dissecting-room by Mr. Braine, Dr. Williams, and Mr. Haward. Dr. Williams will give demonstrations in Histology and the elementary facts of Physiology.

Operative Surgery—Summer Session.

Pupils will have the opportunity to enter a Class under the superintendence of Mr. Holmes, who will assist and direct them in the performance of the various operations of Surgery.

Fee for the Course Four Guineas

Principles and Practice of Physic.

BY DR. BARCLAY.

A general view of Symptoms and their relations to Disordered

Functions, and to the several forms of Altered Structure, is given in this Course of Lectures ; and also the special application of the general facts and doctrines which have been ascertained and established. The Lectures are illustrated by recent Specimens of Morbid Structure, by preparations from the Museum, and by Drawings.

Psychological Medicine.

BY DR. BLANDFORD.

Twelve Lectures on Insanity will be given, consisting of an outline of Psychology, with a description of the rise and progress of Intellectual, Emotional, and Volitional Disorder ; the Causation of Insanity, its Varieties, Pathology, and Treatment. An exposition will also be given of the law of Insanity, certificates of Lunacy, and evidence in Medico-legal cases.

Principles and Practice of Surgery.

BY MR. TATUM.

These Lectures include an exposition of the Principles on which a knowledge of Diseased Structures is based, and an explanation of the various ways in which Nature attempts the reparative process. The principal Operations of Surgery are performed on the dead body during the Course ; and Diseases, Accidents, and Injuries are illustrated by Drawings, Casts, recent Specimens, and Morbid Preparations, including the extensive series presented to the Hospital by Sir B. C. Brodie, Bart., and Mr. Caesar Hawkins.

Dental Surgery.

BY MR. VASEY.

A Course of Lectures on Dental Surgery will be given during the Summer Session.

Medical Pathology.

BY DR. JOHN W. OGLE.

Lectures on Medical Pathology will be delivered at the Hospital during the Winter Session.

Surgical Pathology.

BY MR. HENRY LEE.

Lectures on Surgical Pathology will be delivered at the Hospital during the Summer Session.

Chymistry.

BY HENRY M. NOAD, PH.D., F.R.S.

These Lectures will be divided into three Sections.

The *First* will be occupied with a full consideration of the fundamental doctrines of Chymistry.

In the *Second* division, the materials of the Inorganic world, and their most important combinations, will be examined.

The *Third* division will be devoted to the Chymistry of the *Vegetable* and *Animal* kingdoms.

Practical Chymistry.

A commodious Laboratory has been arranged, and every requisite provided to carry into full effect the regulations of the Medical Corporations, requiring "a specific course of Instruction to be given in the Laboratory, with an opportunity of Personal Manipulation in the ordinary Processes of Chymistry, and of acquiring a knowledge of the various Re-agents for Poisons."

Fee for the use of Apparatus and Materials . . . Four Guineas.

Experimental Philosophy.

Pupils will have the opportunity to attend during the Summer Session a Course of about twenty-five Lectures on Heat, Electricity, and Pneumatics. These Lectures will be extensively illustrated by experiments and diagrams.

Fee for the Course . . . Four Guineas.

Practical Pharmacy.

Gentlemen may be instructed in Pharmacy in the Laboratory and Dispensary of the Hospital.

Midwifery and Diseases of Women and Children.

By

These Lectures comprehend, *First*, the Anatomy and Pathology of the unimpregnated Uterine System; *Secondly*, a description of the Gravid Uterus, and an account of the Diseases of Pregnant Women; *Thirdly*, the Symptoms and Treatment of all the Varieties of Parturition; *Fourthly*, the Diseases of Puerperal Women; and *Fifthly*, the Diseases of Infants. Numerous Drawings and Engravings, and an extensive Museum, are used to illustrate these Lectures, including the numerous preparations recently presented by Mr. Thomas A. Stone.

Pupils have ample opportunities of learning Practical Midwifery, under the superintendence of the Obstetric Physician, by attendance on married women lying-in at their own homes.

Materia Medica.

By DR. DICKINSON.

This Course embraces a consideration of all substances which are used as Medicines, arranged in groups according to their action as Remedial Agents. Their Physical and Chymical characters are described; the mode of detecting their Adulterations illustrated by Ex-

periments; the principal operations of Pharmacy explained; and a few Lectures are devoted to the Theory and Art of Prescribing. An extensive collection of *Materia Medica* is open for the use of the Students.

Medical Jurisprudence.

By DR. WADHAM.

The application of the Physiological, Medical, and Surgical Sciences to the elucidation of Legal investigations, including Toxicology, is taught in these Lectures.

Botany.

By MAXWELL T. MASTERS, M.D., F.L.S.

This Course comprises the Anatomy and Physiology of the Vegetable Kingdom, including an explanation of the Natural and Artificial Systems of Classification. Fresh and dried Specimens of Plants, with numerous drawings, are used to illustrate these Lectures, and Herborising Excursions are made during the Session. Microscopical Demonstrations are frequently given in the course of the Session.

PRIZES AND SCHOLARSHIPS.

List of Students who for some years past have distinguished themselves in the Annual Examinations.

AMESBURY, —.
1847-8.

ANDREWS, HENRY CHARLES,
London.
1852-3; and 1853-4.

ANNESLEY, J. C., Bengal Army.
1851-2; and 1852-3.

ANDERSON, R.
1863-4.

ANDERSON, W. J.
1844-5; and 1845-6.

ARDEN, H. A., Woodchester.
1840-1.

ARCHER, H. RAY, London.
1863-4.

ASH, W.
1856-7.

BABER, J., London.
1841-2.

BALY, J. S., Kentish Town.
1839-40.

BANISTER, GEORGE, Bengal
Army.
1839-40.

BARNES, R., London.*
1840-1; and 1841-2.

BARRATT, J. G., London.
1839-40.

BARRETT, H.
1863-4.

BARTON, F. E., Dover.
1843-4; and 1844-5.

BATTEN, E. B.
1843-4; 1844-5; and 1845-6.

BELLAMY, GEORGE, R.N.
1854-5; and 1855-6.

BELLEW, H. W., Bengal Army.
1851-2; 1852-3; and 1853-4.

* Lecturer on Midwifery at St. Thomas's Hospital, and Obstetric Physician to the London Hospital.

- BELLEW, P. F., Bengal Army.
1851-2; and 1852-3.
- BEVISS, CHARLES, Leeds.
1860-1; and 1862-3.
- BISSHOPP, Haslemere.
1837-8.
- BLAGDEN, J. A., Petworth.
1838-9.
- BLAGDEN, R., Stroud.
1846-7.
- BOLTON, R. T.
1849-50; and 1850-1.
- BOWLES, R. L., Folkestone.
1853-4; 1854-5; 1855-6; and 1856-7.
- BRAYBROOKE, W.
1840-1.
- BRETT, F. C.
1864-5; and 1865-6.
- BRIGHT, J. A.
1856-7; and 1857-8.
- BROWN, J. B. S.
1844-5.
- BUCKLE, H. B., Bengal Army.
1837-8.
- BUDD, JAMES.
1842-3; and 1844-5.
- BULLOCK, E., London.
1839-40; and 1840-1.
- BULTEEL, CHRISTOPHER, Plymouth.
1851-2; and 1852-3.
- CAMPBELL, J.
1837-8.
- CANT, W. E.
1863-4; and 1864-5.
- CARTER, H. V., Bombay Army.
1848-9; 1849-50; and 1850-1.
- CHAMBERS, T. K., M.D. Oxon.*
1839-40.
- CHORLEY, W. F., London.
1838-9.
- CLAPP, PRIDEAUX, R.N.
1860-1.
- CLARKE, JOHN, London.†
1842-3; and 1843-4.
- CLARKE, T., Banbury.
1841-2.
- COE, R. W., Bristol.‡
1843-4.
- COLLINS, J. C.
1843-4.
- COLLISON, J. B., Bengal Army.
1852-3.
- COLLYER, JAS., Minster.
1855-6; and 1856-7.
- COOPER, G. F.
1855-6; and 1856-7.
- COPESTAKE, T. G., Brailsford.
1846-7.
- COPESTAKE, WALTER G., Derby.
1855-6.
- CORNISH, W. R., Madras Army.
1850-1; 1851-2; and 1853-4.
- COTTON, F.
1837-8.
- COTTON, G. P.
1858-9.
- COTTON, R. P., London.§
1838-9; and 1840-1.
- COURTNEY, SYDNEY, Bengal Army.
1853-4.
- COX, W. A.
1865-6.
- CUNDY, OSBERT, London.
1837-8; and 1838-9.
- DAY, FRANCIS, Madras Army.
1849-50; and 1850-1.
- DAY, R. T.
1837-8.
- DICKEN, PERRY, Ashby de la Zouch.
1837-8.

* Formerly Physician to St. Mary's Hospital.

† Physician-Accoucheur to General Lying-in Hospital.

‡ Surgeon to General Hospital.

§ Physician to Hospital for Diseases of the Chest, Brompton.

DICKINSON, W. H., M.D. Cantab.*
1851-2; 1852-3; and 1853-4.

DIXIE, W. F., Lutterworth.
1846-7.

DIXON, HENRY.
1847-8; and 1848-9.

DRIVER, G. V., London.
1842-3.

DRUITT, WM., Wimbourne.
1839-40; and 1840-1.

DUDFIELD, T. ORME, Kensington.
1858-9; 1859-60; and 1860-1.

DUKA, THEODORE, Bengal Army.
1851-2; and 1852-3.

DUKE, F. W.
1851-2.

DUNCAN, THOMAS, Richmond.
1851-2; and 1852-3.

EARLE, GEORGE, Newbegin.
1849-50.

EARLE, JOSEPH, Brentwood.
1848-9; and 1849-50.

EATON, JAMES, Grantham.
1856-7; and 1857-8.

EBSWORTH, A., London.
1842-3.

EDGELOW, T., Teignmouth.
1862-3; and 1863-4.

EVANS, O. S.
1848-9.

EWENS, JOHN, Milton Abbas.
1848-9; and 1849-50.

FIELD, A. G., Brighton.†
1840-1; and 1841-2.

FINCHAM, G. T., London.‡
1839-40.

FIRTH, W., H.M.S.
1850-1.

FLETCHER, G. F.
1842-3; and 1843-4.

FOLKARD, H., Bayswater.
1848-9.

FOSTER, J. F., H.M.S.
1863-4.

FOX, C. H., Bristol.
1856-7.

FOX, E. L., Bristol.
1856-7.

FREEBORN, R. F., Oxford.
1843-4.

FULLER, H. W., M.D. Cantab.§
1841-2.

FULLER, W., London.
1844-5; and 1846-7.

GARLAND, E. C., Yeovil.
1852-3.

GEORGE, J.
1842-3; 1843-4; and 1844-5.

GILLOW, W., Torquay.
1843-4; and 1844-5.

GOODCHILD, F., Warwick.
1847-8.

GOLDSMITH, G. P., Bedford.
1856-7.

GRIFFIN, —.
1841-2.

GRIFFITHS, S. H.
1839-40; 1840-1; and 1841-2.

GUAZZARONI, J. B.
1843-4; and 1844-5.

GUNDRY, J. S., Honiton.
1846-7.

HALDENBY, W., Reedness.
1841-2.

HALSE, C., London.
1851-2.

HARDING, EDWARD.
1854-5; 1855-6; and 1856-7.

HARRISON, W., Skipton.
1850-1.

HARRISON, G., London.
1856-7.

HART, A. D., London.
1855-6.

HASTINGS, C.
1847-8.

* Assistant Physician to St. George's Hospital, and to the Hospital for Sick Children.

† Surgeon to St. Mary's Hospital, Brighton.

‡ Physician to Westminster Hospital.

§ Physician to St. George's Hospital.

HAWARD, J. W., London. 1862-3.	JACKSON, F. W. 1865-6.
HENERY, ED. T. 1839-40.	JACKSON, E. 1865-6.
HETT, H. N., Brigg, Lincolnshire. 1855-6; and 1856-7.	JANE, W., Newton Abbott. 1850-1.
HICKS, R., Baldock. 1845-6.	JARVIS, R. F. 1840-1; 1841-2; and 1842-3.
HIGHMORE, W., Sherborne. 1837-8.	JECKELL, P. B. 1850-1.
HILBRIS, W. 1833-9.	JOHNSON, ATHOL, Brighton. 1840-1.
HOLL, H. B. 1845-6; and 1846-7.	JOHNSON, EDM., London. 1839-40.
HOLLOWAY, J., H.M.S. 1844-5; and 1845-6.	JONES, C. H., M.B. Cantab.† 1840-1.
HOLROYD, W. S. 1865-6.	JONES, H. B., M.D. Cantab.‡ 1837-8; and 1838-9.
HOOPER, J. H. 1853-4.	KEENE, J., Hammersmith. 1852-3; and 1853-4.
HOPE, WILLIAM. 1860-1.	KENYON, G. A. 1864-5.
HOPKINS, G. H., Stone. 1842-3.	KENYON, J. E. 1864-5.
HORNIDGE, T. K., London. 1847-8; 1848-9; and 1849-50.	KERR, J. 1847-8.
HOWSE, A. 1845-6; 1847-8; and 1848-9.	KING, GEORGE, Calne. 1846-7.
HUTCHINSON, T. C. 1837-8.	KINGSLEY, G. H. 1841-2; and 1842-3.
HUTTON, C., L.R.C.P., London.* 1837-8.	KITTOE, K. 1833-9.
HUNT, ALFRED, Hammersmith. 1852-3.	KNIGHT, A. P., R.A. 1852-3; and 1853-4.
HUNTER, G. Y., Madras Army. 1850-1; and 1852-3.	LAKING, F. H. 1864-5; and 1865-6.
HUNTER, CHAS., London. 1853-4; 1854-5; 1855-6; and 1857-60.	LANDON, H. 1845-6.
ILES, F. H. W., Watford. 1852-3.	LANGHORN, JOSEPH, London. 1860-1.
I'ANSON, T. F., Whitehaven. 1844-5; and 1845-6.	LEE, H., London.§ 1837-8.

* Physician-Accoucheur, General Lying-in Hospital.

† Physician to St. Mary's Hospital.

‡ Formerly Physician to St. George's Hospital.

§ Surgeon to St. George's Hospital.

- LEE, FRED. F., Salisbury.
1859-60.
- LEIGH, W., London.
1863-4.
- LEWIS, H., Rickmansworth.
1852-3; 1853-4; 1854-5; and 1855-6.
- LICHFIELD, W.
1848-9; and 1849-50.
- LLOYD, A.
1838-9; and 1839-40.
- LLOYD, J.
1845-6.
- LLOYD, N. H., Truro.
1860-1.
- LOMAX, W. J., Lincoln.
1839-40.
- LOVEGROVE, T. H.
1864-5.
- M'CONNELL, J. F.
1865-6.
- MACKAY, A. D.
1852-3.
- MAGRATH, M., R.N.
1855-6.
- MALTON, C.
1844-5.
- MANNING, FREDERICK N., R.N.
1857-8; 1858-9; and 1859-60.
- MARLEY, R., Broomyard.
1844-5.
- MARSHALL, E. J.
1852-3; and 1853-4.
- MARTIN, E., Weston-super-Mare.
1843-4.
- MAYNE, T. H.
1846-7.
- MERRIMAN, J. J., Kensington.
1847-8.
- MITCHELL, JAS. I., Bath.
1843-4.
- MORGAN, JOHN, London.
1839-40; and 1840-1.
- MORRIS, C. J., Edmonton.
1848-9.
- MOSELY, A., London.
1856-7.
- NAYLER, G., London.
1850-1; and 1851-2.
- NICHOLAS, E., London.
1855-6.
- NICHOLLS, J., Wiveliscombe.
1851-2.
- NORMAN, GEORGE.
1865-6.
- NOURSE, W. E. C., Brighton.
1839-40; and 1840-1.
- OGLE, JOHN W., M.D. Oxon.*
1847-8.
- PAGE, W. IRVING.
1859-60.
- PARKER, J. H., Whitechurch.
1846-7; and 1848-9.
- PARNELL, L., London.
1844-5; 1845-6; 1846-7; and 1847-8.
- PARRY, H. H., Allington.
1855-6; and 1856-7.
- PENNY, J., Madras Army.
1850-1; 1851-2; and 1852-3.
- PHILIPE, E. H.
1843-4.
- POCOCK, W., London.
1838-9; and 1839-40.
- PODE, C. C.
1864-5; and 1865-6.
- POLLOCK, GEORGE D.†
1837-8; and 1839-40.
- POLLOCK, H.
1849-50.
- POMERY, J. R.
1851-2.
- POPE, T. R., Hastings.
1840-1.
- PRYTHERCH, J. D., H.M.S.
1853-4.
- RICHARDSON, H. W. H.
1838-9.
- RING, E. C.
1864-5; and 1865-6.

* Physician to St. George's Hospital.

† Surgeon to St. George's Hospital.

ROBERTS, C., Dunster.
1852-3; and 1853-4.

ROBERTS, CHAS., York Dispensary.
1856-7; and 1857-8.

ROBERTS, W. P., London.
1844-5; 1845-6; and 1846-7.

ROGERS, G. G., London.
1852-3.

ROGERS, GEORGE L.
1856-7.

ROSS, J. T. C., Bengal Army.
1843-4.

ROUSE, JAMES, London.*
1846-7; and 1848-9.

ROYSTON, C., London.
1849-50; 1850-1; and 1851-2.

SANDON, J. H. B.
1842-3; and 1845-6.

SEATON, DANIEL, Oakham.
1853.

SIMS, FRANCIS, M. B.
1863-4; and 1865-6.

SMITH, R. J.
1837-8.

SMITH, T. H., London.
1842-3; 1843-4; and 1844-5.

SMITH, HEYWOOD, M. A., S.M. Oxon.
1862-3; and 1864-5.

SOLTAU, W. F.
1837-8.

SPACKMAN, W., Wolverhampton.
1841-2; and 1842-3.

SPIITTA, R. J., Clapham.
1837-8; 1838-9; and 1839-40.

STEVENS, W. B., R.N., Plymouth.
1848-9; 1849-50; and 1850-1.

STRONG, H. J., Croydon.
1852-3.

SUTTON, WM., Dover.
1853-4; 1854-5; and 1855-6.

SYMES, J. G., Dorchester.
1845-6.

TATE, F. S., Louth.
1841-2.

TAYLOR, JOHN, Bayswater.
1837-8.

TEGART, ED., London.
1841-2; and 1842-3.

TEPPER, JOHN, London.
1860-1; and 1861-2.

THOMPSON, W., London.
1846-7.

TINDALL, W. R.
1863-4; and 1864-5.

TOMLINSON, G. D., H.M.S.
1856-7.

TRIMNELL, G. F.
1845-6.

UNDERHILL, F. W., Tipton.
1863-4; and 1864-5.

UWINS, H.
1840-1.

VENNING, EDGCOMBE, 2d Life-Guards.
1855-6; and 1857-8.

WADHAM, W., M.D. London.†
1844-5.

WALFORD, W. G., Hertford.
1859-60.

WALKER, EDWARD, H.M.S.
1855-6; and 1856-7.

WARDER, A. W.
1837-8; and 1838-9.

WASBROUGH, R., M.D., Westbury.
1837-8.

WATKINS, R. W., Towcester.
1841-2.

WATSON, G. S.
1862-3; 1863-4; and 1864-5.

WELLS, EDWARD, M.D. Oxon., Reading.‡
1833-9; and 1839-40.

* Lecturer on Anatomy, St. George's Hospital; Assistant-Surgeon to the Ophthalmic Hospital.

† Assistant-Physician to St. George's Hospital.

‡ Physician, Royal Berkshire Hospital.

WHITE, ARTHUR, London.
1839-40.

WILLIAMS, W. J.
1849-50; 1850-1; and 1851-2.

WILLIS, J. H., Lewdown, Devon.
1851-2; and 1852-3.

WOODCOCK, E. W.
1842-3.

WOOLFEYS, I. A.
1844-5.

WOOLMER, S. E., London.
1853-4.

WYNDOWE, S. J., Madras Army.
1850-1.

WYNTER, H. B.
1857-8.

*Names of Students who gained Prizes and Scholarships during
the Session 1865-6.*

The William Brown Exhibition.

F. M. B. SIMS.

Sir Benjamin Brodie's Clinical Prize in Surgery.

E. C. RING.

The Henry Charles Johnson Prize in Anatomy.

J. F. M'CONNELL, first prize.

W. A. COX, second prize.

E. JACKSON } hon. certificate.
F. C. BRETT }

General Proficiency Prizes.

Third year, E. C. RING, prize.

" " F. W. JACKSON, hon. certificate.

Second year, C. C. PODE, prize.

" " W. A. COX

" " J. F. M'CONNELL } hon. certificate.

" " F. H. LAKING }

First year, GEORGE NORMAN, prize.

" " W. S. HOLROYD, hon. certificate.

Sir Charles Clarke's Prize for Good Conduct.

Not reported.

THE END.

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